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No. 1

COCCIDÆ OF THE PHILIPPINE ISLANDS¹

By ELIZABETH ROBINSON

SIX PLATES

This paper is intended to bring together all obtainable information concerning the known species and available specimens of Philippine Coccidæ. For the advantage of the general entomologist and the specialist in Coccidæ it was believed advisable to undertake a synoptic treatment of this family of Hemiptera. From the collections of Prof. C. F. Baker, which were sent to Prof. T. D. A. Cockerell, many species have been determined. It is evident that the available specimens represent only a few of the great number of Coccidæ to be found in the Philippine Islands. With few exceptions those studied have come from Luzon Island.

I take this opportunity to express my sincere thanks to those who have aided me—especially to Professor Cockerell, under whose direction the entire study has been made, and to Professor Baker for specimens and for a list of food plants and bibliographies of Philippine Coccidæ.

COCCIDÆ

Synoptic table of the subfamilies.²

- | | |
|---|----------------|
| Adult female with legs (in known Philippine species). | |
| Anal ring of female hairless; legs present in all stages; ovipore setaceous or waxy; mouth parts present in adult female. Eyes of male compound | Monophlebinae. |

¹ This paper was written as the author's major thesis, presented at the Colorado Agricultural College for the degree of master of arts.

² The Tachardinae, or lac insects, will probably be found to occur in the Philippines. *Tachardia suerentiaca* Ckll. occurs in Java on *Citrus*, *Ficus*, and *Albizia*.—COCKERELL.

- b'. Anal ring with hairs.
- c'. Female with posterior extremity cleft; anal orifice closed above by a pair of triangular plates; secretion of female appearing cottony, waxy, glassy, or horny..... Lecanitinae.
- c'. Female with no posterior cleft; no triangular anal plates; female usually with a mealy secretion..... Dactylopinae.
- a'. Adult female without legs; scale covering adult composed partly of exuviae; abdomen terminating in a compound segment or plate; anal ring hairless Diapinae.

MONOPHLEBINÆ

Synoptic table of the genera.

- a'. Adult female with a long posterior ovisac; male without lateral fleshy caudal processes Icerya.
- a'. Adult female without a posterior ovisac; male with lateral fleshy caudal processes.
- b'. Female antennæ 9-jointed; male with ten caudal appendages.. Drosicha.
- b'. Female antennæ 6- or 7-jointed; male unknown..... Monophlebulus.
- b'. Female antennæ 11-jointed; male with six to eight caudal appendages Liavia.

Genus ICERYA Signoret

Type, *Dorthesia seychellarum* Westwood.

Female soft with long, usually ribbed ovisac, varying in color; antennæ 11-jointed; skin with long scattered hairs and rounded spinnerets. Male without lateral fleshy caudal processes.

Synoptic table of the species.

- a'. Antennæ of female with ten joints (Plate I, fig. 1); filaments numerous, ovisac not entirely covering the insect (Plate I, fig. 3)..... jacobseni.
- a'. Antennæ of female with eleven joints (Plate I, figs. 4, 5); secretion densely covering the body.
- b'. All the secretion white, filaments not numerous..... candida.
- b'. Part of the secretion a bright yellow, body with many long filaments seychellarum.

Icerya jacobseni Green.

Icerya jacobseni GREEN, Tijdsch. voor Ent. (1912), 55, 316.

Adult female flat, oval, reddish orange, the color obscured by the white mealy secretion excepting in two lateral stripes where the color is exposed; margin with a series of 20 radiating, long, curved, white, waxy processes (Plate I, fig. 3); denuded insect 5 to 7 millimeters long. Antennæ 10-jointed, the four basal joints cylindrical, the next five subglobular, the terminal elongate-oval (Plate I, fig. 1). Legs well developed, moderately stout, tibia slightly shorter than femur and trochanter together, tarsus less than half as long as tibia, claw pointed, digitules

hairlike. Derm with numerous hairs and ceriferous glands (Plate I, fig. 2), varying in size and form on various parts of the body. Larvae with more of the mealy secretion; antennæ 6-jointed. (From the original description.)

Luzon, Laguna, Los Baños (*C. F. Baker*), on *Leucosyke*

Icerya candida Cockerell.

Icerya candida COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 128.

Adult female with ovisac not grooved, pure white, dense, a few glassy filaments, about 7 millimeters long. Antennæ dark red-brown, 11-jointed, joint four the shortest, eleven longest and slender, two and three subequal and longer than any between three and eleven (Plate I, fig. 4). Legs ordinary, dark reddish, anterior femora stout. Young with caudal bristles longer than the body; antennal club stout with very long bristles. (From the original description.)

Luzon, Manila (*C. H. T. Townsend*), on a cultivated tree.

Icerya seychellarum (Westwood).

Icerya seychellarum (Westwood) FERNALD, Cat. Coccidae of the World (1908), 27; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 128; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 428.

Adult female about 5 millimeters long, with ovisac smooth, entirely yellow or with edges spotted and anterior portion colored with yellow, filaments numerous. Antennæ dark brown, 11-jointed, joints four to nine very similar and beadlike, eleven the longest, of the others two and three the longest, all of the joints with numerous hairs (Plate I, fig. 5). Legs heavy, dark brown. Entire body with dense hairs.

Luzon, Tayabas, Lubcan (*Townsend*), on *Rosa*; Laguna, Los Baños (*Baker*), on *Citrus decumana*, *Diospyros kaki*, and *Ficus minahassae*; Manila (*Baker*), on *Psidium guajava*.

Genus *DROSICHA* Walker

Type, *Drosicha contrahens* Walker.

Female soft, somewhat elongated, more or less hairy with cottony or powdery secretion; antennæ 9-jointed; no posterior ovisac. Male with ten abdominal processes.

Synoptic table of the species.

- | | |
|--|--------------|
| a ¹ . Only the male described | palavanica. |
| a ² . Only the female described | lichenoides. |

Drosicha palawanica Cockerell.

Drosicha palawanica COCKERELL, Journ. Econ. Ent. (1916), 9, 285.

Length of male about 3.5 millimeters, exclusive of abdominal processes; wings nearly 5 millimeters long, black, with the usual venation and two hyaline lines; costal field dark sepia; head and thorax dark red, front and mesothorax black; antennæ black, with long black hairs, third joint with three nodes; legs black; abdomen almost as broad as long, red, strongly suffused with blackish dorsally, with ten red fleathy processes, successively longer caudad, each with long black hairs at end; the last processes are scarcely over 1 millimeter long.

PALAWAN, Puerto Princesa.

Drosicha lichenoides Cockerell.

Drosicha lichenoides COCKERELL, Journ. Econ. Ent. (1913), 6, 142.

Female about 12 millimeters long, 8.5 broad, 5 high, light reddish, strongly emarginate anteriorly, smooth above with segmentation distinct; legs and antennæ dark brown, antennæ about as long as anterior femur plus trochanter, 9-jointed, measured in microns: (1) 240, (2) 240, (3) 336, (4) to (8) each 320, (9) 590; femora stout, claws strongly curved; lateral margins of insect with very short dense hairs, but with occasional long slender hairs. (From the original description.)

Luzon, Laguna, Los Baños (*Baker*), on *Ficus nota*. This species also occurs on various other trees.

Genus **MONOPHLEBULUS** Cockerell

Type, *Monophlebulus fuscus* Maskell.

Characters similar to those of *Drosicha*; female antennæ 6- or 7-jointed.

Monophlebulus townsendi Cockerell.

Monophlebulus townsendi COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 127.

Female gray, flat, 9 millimeters long, 7.5 broad, about 3 high; the true color is dark reddish, the gray being due to the mealy secretion. Anal orifice small and round, hairless. Legs and antennæ black; legs very stout; antennæ about as long as femur and trochanter of middle leg, of six joints, three to six about equal, two short and stouter, one broader than long, the joints with coarse pale yellowish bristles. Middle of abdominal region concave beneath, sides densely covered with white cottony tomentum; cephalic margin emarginate, with long, coarse black

bristles. Mouth parts visible in the form of a dark projecting cone. (From the original description.)

Luzon, Batangas (Townsend).

Genus LLAVEIA Signoret

Type, *Coccus azin* Llave.

Characters similar to those of *Drosicha*; female antennæ 11-jointed; male with fleshy processes arranged along the sides of the abdomen.

Synoptic table of the species.

- | | |
|---|---------------|
| a'. Male with base of wing and costal area bright red; abdomen with six processes | sanguinea. |
| a'. Areas of wing not red. | |
| b'. Abdomen of male with six processes; a large species. | benguetensis. |
| b'. Abdomen with eight processes. | lusonica. |

Llaveia sanguinea Cockerell.

Llaveia sanguinea COCKERELL, Can. Ent. (1915), 47, 344.

Male about 5 millimeters long, length of wings, about 7; antennæ rather thick, middle joints with three whorls of long reddish hairs; legs red, hairy; eyes dark red, very prominent on stout stalks; anterior part of thorax dull black, forming a lobe extending over the head, posterior to this the thorax is shining black with a broad, transverse reddish ochreous band, abdomen broad, red, with six long fleshy processes; penis long with a large raspberry-pink knob; wings ample, extreme base and costal region bright red. (From the original description.)

PALAWAN, Puerto Princesa (Baker).

Llaveia benguetensis Cockerell.

Llaveia benguetensis COCKERELL, Journ. Econ. Ent. (1916), 9, 235.

"Male.—Length 4.5 millimeters, exclusive of abdominal processes; wings about 7 millimeters long, black, with usual venation and two hyaline lines; costal field dark reddish brown; head and thorax black, the mesothorax shining, region just below wings dark red and dull; mesosternum enlarged, convex, polished black; eyes very prominent, constricted at base, placed at lower anterior corners of head; antennæ black with very long black hairs; third joint with three nodes; legs black; abdomen broad, dark red, with the dorsal region strongly suffused with black, apex deeply emarginate; six long fleshy abdominal processes, the first pair shorter than the others, which are subequal, and a little longer than the diameter of the abdomen."

Luzon, Benguet, Baguio (Baker 5341).

***Llaveia luzonica* Cockerell.**

Llaveia luzonica COCKERELL, Bull. Am. Mus. Nat. Hist. (1914), 38, 334.

Male about 6 millimeters long, wings about 6.5 long; antennæ reddish black, in the middle of the antennæ are three nodules to a joint, each bearing a whorl of long black bristles; head mostly yellowish flesh-color, dark above bases of antennæ, occipital margin dusky; thorax pale carneous, dorsal region shining black, scutellum pale yellowish carneous, mesothorax black; abdomen broad, pink, with eight hairy plumbeous tails not equal in length to the diameter of the abdomen; legs dark castaneous; wings ample, black, with two light lines; lobes or lappets at the sides of the thorax anteriorly, extending from the occipital region to a short distance before the wings. (From the original description.)

Luzon, Laguna, Mount Maquiling and Los Baños (*Baker*).

DACTYLOPIINÆ**Genus PSEUDOCOCCUS Westwood**

Type, *Dactylopis longispinus* Targioni Tozzetti.

Female with a mealy secretion; skin with spines and glands; legs and antennæ well developed in the adult.

Synoptic table of the species

- a'. Female yellow after being boiled in KOH; tibia of hind leg three times as long as tarsus (Plate I, fig. 7) *virgatus*.
- a''. Not so; legs stout and short (Plate I, fig. 9).
 - b'. Body crimson when boiled in KOH; pigment present especially in embryonic young *tayabaanus*.
 - b'. Body purple after being boiled in KOH *lilacinus*.
 - b'. Body green when boiled in KOH. *filamentosus*.

***Pseudococcus virgatus* (Cockerell).**

Pseudococcus virgatus (COCKERELL) FERNALD, Cat. Coccidae of the World (1908), 111; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 130; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 428.

Female covered by a cottony secretion with many glassy filaments; this occurs in matted areas, making it difficult to determine the amount on one individual. Female distinctly segmented, 4 to 5 millimeters long, broadly elongated. Legs twice as long as antennæ, hind tibia three times as long as tarsus, claw slender, simple (Plate I, fig. 7). Antennæ 8-jointed, joints two, three, and eight the longest, the other four subequal (Plate I, fig. 6). Anal ring with six long, slender hairs; two

rounded caudal areas laterad of anal ring each with two stout spines and one long spine.

Luzon, Laguna, Los Baños (Baker), on *Anona squamosa*, *Arachis hypogaea*, *Caesalpinia pulcherrima*, *Codiaeum variegatum*, *Coffea arabica*, *Graptophyllum*, *Solanum*, *Spondias*, and *Xanthosoma sagittifolium*.

Pseudococcus virgatus (Cockerell) variety.

Pseudococcus virgatus (COCKERELL) variety COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 120.

Secretion of female full of glassy filaments. Antennæ 8-jointed, measured in microns: (1) 50, (2) 63–65, (3) 70–72, (4) 87–42, (5) 40–45, (6) 45–47, (7) 45–47, (8) 100. This insect differs from typical *P. virgatus* in the characters of the antennæ, and while the antennæ resemble those of *P. kraunhiae* Kuwana, the secretion is different. (From the original description.)

Luzon, Tayabas, Lucban (Townsend), on *Codiaeum variegatum*.

Pseudococcus tayabanus Cockerell.

Pseudococcus tayabanus COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 129.

Female covered with mealy secretion, distinctly segmented, when dry looking like minute specimens of commercial cochineal; oval when mounted; after boiling, the body shows much dull crimson pigment. Eyes well developed. Anal ring with six hairs placed in a wide square incision. Lateral margins of segments projecting, the points bearing spines; skin covered with round glands. Labium long and narrow. Legs stout, length in microns: Tibia, 125; tarsus, 75; claw simple and stout. Antennæ 8-jointed, measured in microns: (1) 50, (2) 50–62, (3) 50–52, (4) 25–27, (5) 33–40, (6) 40–45, (7) 37–40, (8) 87. Larva with longitudinal rows of bristles; six stout hairs on anal ring; claw long and simple; antennæ 6-jointed. (From the original description.)

Luzon, Tayabas, Lucban (Townsend), on *Theobroma cacao*.

Pseudococcus lilacinus Cockerell.

Pseudococcus lilacinus COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 128.

Female densely covered with white meal, globose. When mounted, subglobular; after boiling, the body appears lilac. Legs fairly stout, length in microns: Hind leg, femur and trochanter, 245; tibia, 150; tarsus, 70; claw stout and simple. Antennæ

8-jointed, length in microns: (1) 25-55, (2) 82-52, (3) 87-50, (4) 20-45, (5) 25-42, (6) 27-30, (7) 80, (8) 80. "In one instance, joint three measured 73, evidently being combined with four." (From the original description.)

Luzon, Tayabas, Lucban (*Townsend*), on *Citrus nobilis*.

Pseudococcus filamentosus (Cockerell).

Pseudococcus filamentosus (COCKERELL) FERNALD, Cat. Coccidae of the World (1903), 101; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 106.

Female subglobose, covered with dense white secretion. Mounted female 3.5 to 4 millimeters long, broad oval, green when boiled in KOH. Anal ring with six hairs. Skin with numerous, small, round glands. Legs stout, claw simple (Plate I, fig. 9). Antennae 7-jointed, joint seven the longest, the others subequal, but five and six the shortest (Plate I, fig. 8).

Mindanao, Tanghulan (*Baker*), on *Coffea arabica*.

LECANIINAE

Synoptic table of the genera.

- a'. Adult female triangular; cottony ovisac slightly developed, forming a fringe around the caudal margin (Plate II, fig. 1) *Protopulvinaria*.
- a'. Female oval or suboval in Philippine species.
- b'. Female with a posterior ovisac; body more or less chitinous. *Pulvinaria*.
 - b'. Female without ovisac.
 - c'. Covering of female consisting of wax, often thick... ... *Ceroplastes*.
 - c'. Female naked or covered by a film of secretion.
 - d'. Female with marginal fan-shaped scales (Plate II, fig. 18). *Paralecanium*.
 - d'. Not so.
 - e'. Ventral surface in abdominal region with groups of pores arranged in a semicircle (Plate II, fig. 14) .. *Flatylecanium*.
 - e'. Not so.
 - f'. Skin with polygonal areas containing pits; hard when mature; high convex or hemispherical (Plate II, figs. 18 and 19). *Baissetia*.
 - f'. Skin without polygonal areas containing pits; soft when mature; never high convex *Coccus*.

Genus PROTOPULVINARIA Cockerell

Type, *Protopulvinaria conveza* Hempel.

"Differs from *Lecanium* (*Coccus*) in the presence of a narrow fringe of cottony (cottonlike) secretion surrounding the female after oviposition. This fringe is not of the same nature as the ovisac of *Pulvinaria*, as it does not actually cover the eggs, which are all concealed beneath the body of the insect." (Green.)

Protopulvinaria longivalvata bakeri Cockerell.

Protopulvinaria longivalvata bakeri COCKERELL, Bull. Am. Mus. Nat. Hist. (1914), 33, 332.

Female scale 2.25 millimeters long, 1.75 millimeters broad, light ferruginous (Plate II, fig. 1); marginal spines few, rather stout, bent, small, and short; stigmatic spines in threes, one long, the others very short; anal plates greatly elongated, near the center of the body; legs ordinary; antennæ 8-jointed. The following measurements are in microns: Anterior leg, femur and trochanter, 130; tibia, 80; tarsus without claw, 45; antennæ (1) 28, (2) 48, (3) 33, (4) 28, (5) 23, (6) 18, (7) 23, (8) 48 (Plate II, fig. 3). Almost without cottony secretion. Male scale (Plate II, fig. 2). Typical *P. longivalvata* Green comes from Ceylon. (From the original description.)

Luzon, Laguna, Los Baños (Baker), on *Voacanga globosa*.

Genus PULVINARIA Targioni Tozzetti

Type, *Coccus vitis* Linnaeus.

Female insect flat, oval or suboval, secreting an elongated ovisac which does not cover the insect, ovisac adherent to the plant; body becomes hard, without dorsal patches of secretion. Male scale elongate, waxy.

Synoptic table of the species.

a'. Female small, about 1,865 microns long	tyleri.
a'. Female larger.	
b'. Female antennæ of eight joints (Plate II, figs. 4 to 6).	
c'. Marginal spines long and stout, more or less branched	polygonata.
c'. Marginal spines numerous, blunt	thespesiae.
c'. Marginal spines fewer, pointed	psidii.
b'. Antennæ of less than eight joints	psidii var. philippina.

Pulvinaria tyleri Cockerell.

Pulvinaria tyleri COCKERELL, Proc. Davenport Acad. Sci. (1905, 10, 132.

Female smallish, light brown, with a loose, shapeless, fluffy white ovisac; mounted female about 1,865 microns long; stigmatic spines in threes, the long one stout and about 60 microns long, the short ones about 15; marginal spines stout, not close together, simple or slightly bifid at the ends; legs ordinary, measurements of anterior leg in microns: Femur and trochanter, 220; tibia, 168; tarsus without claw, 92. Antennæ 8-jointed, measurements in microns: (1) 40, (2) 62, (3) 70, (4) 40, (5) 40, (6) 27, (7) 22, (8) 50. (From the original description.)

Luzon, Batangas (Townsend), on *Antigonon leptopus*.

Pulvinaria polygonata Cockerell.

Pulvinaria polygonata COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 181.

Female light brown, ovisac white, broad and fluffy, irregular in form; mounted female about 3 millimeters long and 2 millimeters broad; skin with irregular polygonal structures like some species of *Saissetia*; mouth parts small; marginal spines long, stout, more or less branched at the ends but not greatly broadened, stigmatal spines ordinary; anal plates together forming almost a square. Anterior leg measured in microns: Femur and trochanter, 215; tibia, 150; tarsus without claw, 75; claws hooked, their digitules fully twice their length. Antennae measured in microns: (1) 50, (2) 52, (3) 75, (4) 57, (5) 50, (6) 30, (7) 30, (8) 50. (From the original description.)

LUZON, Manila (*Townsend*), on a cultivated tree.

Pulvinaria thespesiae Green.

Pulvinaria thespesiae GREEN, Coccidae of Ceylon (1909), pt. 4, 259; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Female brownish yellow, when alive pale green, ovisac white, broad, fluffy, but not abundant; mounted female 3.5 to 4 millimeters long; mouth parts ordinary; anal plates heavy, elongated, triangular, six anal hairs reaching to posterior tips of plates; legs slightly longer than antennae, claw denticulate. Antennae 8-jointed, third joint the longest, second, third, fifth, and eighth subequal (Plate II, fig. 6); numerous truncate marginal spines with three smaller and one larger alternating; stigmatic area with six stout pointed spines (Plate II, fig. 7).

LUZON, Laguna, Los Baños (*Baker*), on *Codiaeum variegatum*.

Pulvinaria psidii Maskell.

Pulvinaria psidii MASKELL, FERNALD, Cat. Coccidae of the World (1908), 187; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 35, 427.

Female yellow, ovisac white, fluffy, irregular in form, often matted; mounted female about 2.5 to 3 millimeters long; anal plates triangular, anal ring with hairs reaching to posterior tips of anal plates; mouth parts ordinary; legs about twice as long as antennae, femur usually broad; antennae 8-jointed, three longest, two, three, five, and eight almost subequal (Plate II, fig. 4); a few pointed marginal spines; stigmatic area with spines in threes, median stout and three times as long as the other two (Plate II, fig. 5).

LUZON, Laguna, Los Baños (*Baker*), on *Antidesma bunius*, *Eugenia jambos*, *Ficus*, and *Psidium guajava*.

Pulvinaria paidii philippina Cockerell.

Pulvinaria psidii philippina Cockburn, Proc. Davenport Acad. Sci. (1905), 10, 132.

Female scales and ovisacs matted together. Marginal hairs broad and flattened at ends, the margins of the flattened parts slightly fimbriated; tibia very long; antennæ 6-jointed, third joint twice as long as either two or three, joints two and five each with a very long bristle. "The long tibia, long third antennal joint, marginal hairs, long bristles on joints two and five of the antennæ, etc., all show this insect to be close to *P. ficus* Hempel and *P. psidii* Mask. The 6-jointed antennæ are distinctive, but may not be constant." (From the original description.)

Luzon, Tayabas, Lucena (Townsend), on *Ficus*.

Genus CEROPLASTES Gray

Type, *Ceroplastes janesiensis* Gray.

"Covering of female consisting of wax, often thick; no marginal fringe or radiating processes; a more or less developed caudal horn, visible on removing the wax." Secretion of male waxy. (From Cockerell.)

Ceroplastes gigas Cockerell.

Ceroplastes gigas Cockrell, Bull. Am. Mus. Nat. Hist. (1914), 33, 331.

Scale on branch of tree; wax white and smooth. Female scale 17.5 millimeters long, 14.5 millimeters broad, about 12 millimeters high; wax not divided into plates; a deep median dorsal pit; at sides are two angular projections clasping the branch; wax about 5 millimeters thick. Adult female oval, about 7 millimeters long, chestnut red; antennae and legs light ferruginous. Antennae long and slender. Cephalic margin of female broadly rounded (Plate II, fig. 9), caudal margin trilobed (Plate II, fig. 8). (From the original description.)

Luzon, Laguna, Mount Maquiling (Baker), on an unknown shrub.

Genus **PARALECANIUM** Cockerell

Type, *Lecanium frenchii* Maack.

Female flat or slightly convex, legs and antennae slender, margin of body with fan-shaped scales.

Synoptic table of the species.

- a'. Adult female red-brown; antennae 7-jointed; legs well developed (Plate II, fig. 10) *luzonicum*.
 a'. Adult female pale yellowish; antennae 3-jointed; no legs (Plate II, fig. 11) *ecophylle*.

Paralecanium lusonicum Cockerell.

Paralecanium lusonicum COCKERELL, Bull. Am. Mus. Nat. Hist. (1914), 33, 383; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 428.

Female scale broad-oval, 4.5 millimeters long, red-brown; dorsal surface in folds and reticulations; ends of anal plates very sharp; stigmatic spines in threes, very stout, blunt, margin of stigmatic notch thickened; legs with tarsus longer than tibia. Anterior leg: Femur and trochanter, 180 microns; tibia, 68; tarsus, 75. Middle leg: Tibia, 78; tarsus, 105; claw digitules stout; antennæ 7-jointed, but with joints four to six more or less fused, measured in microns: (1) 23–25, (2) 23, (3) 63–70, (4) 30, (5) 25, (6) 30, (7) 33–38 (Plate II, fig. 10). Marginal plates transversely broad-oval, overlapping, margins entire. (From the original description.)

Luzon, Laguna, Los Baños (*Baker*), on *Plectronia viridis*; Mount Maquiling (*Baker*), on *Tetrastigma*.

Paralecanium cocophylle Banks.

Paralecanium cocophylle BANKS, Phil. Journ. Sci. (1906), 1, 235.

Adult female broad oval, 4 to 5 millimeters long, 3.5 to 4 millimeters broad; pale transparent yellow; dorsal surface minutely punctate and covered with a thin waxy substance in addition to waxy laminae; regularly arranged suboval pores over entire dorsum. Stigmatic areas with three long, stout, blunt, curved spines not reaching the outer margin, margin with slightly overlapping scales (Plate II, fig. 18). Antennæ indistinctly 3-jointed (Plate II, figs. 11 and 12). Anal plates triangular, pointed. Minute spinnerets in four ill-defined groups on each side. Male scale 2.27 millimeters long, 1.20 millimeters broad; elongate oval; more convex than female. (From the original description.)

Luzon, Manila (*C. S. Banks*), on *Cocos nucifera*; Laguna, Mount Maquiling (*Baker*), on *Dillenia philippinensis*.

Genus PLATYLECANIUM Cockerell and Robinson

Type, *Neolecanium cribigerum* C. and R.

Female flat, broad oval, without waxy covering; antennæ small or rudimentary; legs absent; ventral surface of abdominal region with groups of pores arranged in a semicircle in the center of which is the anal aperture; marginal bristles small and simple.

Platylecanium cribrigerum (Cockerell and Robinson).

Neolecanium cribrigerum COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 110.

Platylecanium cribrigerum COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Female flat, broad oval, about 4.25 millimeters long, 3.55 millimeters broad, no waxy or glassy covering, rich red-brown. Derm translucent brownish after boiling; posterior region with large, scattered, glandular processes, each shaped like an ink bottle and emitting a very short bristle (Plate II, fig. 17); in the abdominal region are six large patches, which are more strongly chitinized than the surrounding tissue and perforated with a number of small round gland orifices (Plate II, fig. 14), these patches are three on each side arranged in a semicircle in the middle of which are the anal plates (Plate II, fig. 15). Mouth very small. Antennæ rudimentary, without joints (Plate II, fig. 16). No legs. Margin with a few, very minute, simple bristles. Anal plates triangular, rounded at the ends, anal ring appearing moniliform.

Luzon, Laguna, Los Baños (Baker), on *Piper loheri*.

Genus *SAISSETIA* Deplanches

Type, *Lecanium hemisphaericum* Targioni Tozzetti.

Adult female high convex or hemispherical, hard when mature; skin with cell-like markings; legs and antennæ developed.

Synoptic table of the species.

a'. Female usually black; distinctly carinate; the ridges H-shaped oleae.

a''. Not so; adults without carinae.

b'. Female approaching black; irregular polygonal derm areas (Plate II, fig. 19)

nigra.

b''. Female brown; smaller; very convex; oval gland orifices (Plate II, fig. 18)

hemisphaerica.

Saissetia oleae (Bernard).

Saissetia oleae (BERNARD) FERNALD, Cat. Coccidae of the World (1908), 205; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 130.

Adult female short ovate, high convex, carinae forming a letter H, brownish black, shiny, rugose, 2.5 to 4 millimeters long, 1.5 to 3 millimeters wide, 1.5 to 2.5 millimeters high. Derm cells elongate, each inclosed in an irregular polygonal tessellation; antennæ of eight joints, three longest, six and seven shortest; legs little longer than antennæ; numerous small tubular spinnerets; three stigmatic spines, central one longest; marginal spines simple or flattened at apex.

Male scale elongate, glassy, divided into nine plates. The male is rarely seen.

Luzon, Tayabas, Lucban (*Townsend*), on *Gardenia* or *Jasminum*.

Saissetia nigra (Nietner).

Saissetia nigra (NIETNER) FERNALD, Cat. Coccidae of the World (1908), 204; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 180; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Female long oval to broad ovate, low convex, shining black, 3 to 4 millimeters long; marginal hairs small, simple, and those within the margin more or less divided; polygonal derm cells (Plate II, fig. 19); antennæ of seven joints, four the longest; legs slender, claws with long digitules.

"Male puparium transparent glassy; divided into nine plates, of which two are central and seven marginal." (Green.) Male with dark markings on thorax above.

Luzon, Manila (*Townsend*), on *Manihot utilissima*; Laguna, Los Baños (*Baker*), on *Eriodendron anfractuosum* and *Withania organifolia*.

Saissetia hemispherica (Targioni Tozzetti).

Saissetia hemispherica (TARGIONI TOZZETTI) FERNALD, Cat. Coccidae of the World (1908), 202.

Saissetia hemispherica (TARGIONI TOZZETTI) COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 180; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Female insect hemispherical, ovate, highly convex, smooth and shining, light to red-brown, carinæ forming a letter H not retained in the adult, 2.25 to 4.25 millimeters long, 1 to 2.75 millimeters wide, 1.5 to 2 millimeters high. Dermis with numerous ovate, clear derm cells (Plate II, fig. 18); antennæ of eight joints, two, three, four, five, eight longest, six and seven equal in length; legs stout and longer than antennæ, claws with digitules; the marginal hairs flattened at apices and variously serrated, some simple; stigmatic spines all strong and blunt, central one longest; numerous tubular spinnerets.

Male scale narrow and elongated, carinate, divided into nine plates, 1.25 millimeters long. Male reddish, without dark markings on thorax above.

Luzon, Tayabas, Lucban (*Townsend*), on *Cycas circinalis* and other cultivated plants; Laguna, Los Baños (*Baker*), on *Anona muricata* and *Calanthe*.

Genus COCCUS Linneaus

Type, *Coccus hesperidum* Linneaus.

Adult female never high convex or hemispherical, more or less soft; oval; light in color; legs and antennae well developed.

Synoptic table of the species.

- a¹. Female antennae 6- or 7-jointed (Plate I, fig. 11).
- b¹. Female scale red-brown, quite flat, broad oval *diversipes*.
- b². Female scale pale green; moderately convex, oval, often asymmetrical. *viridis*.
- a². Female antennae 8-jointed (Plate I, fig. 10) *elongatus*

Coccus elongatus (Signoret).

Coccus (?) *elongatus* (SIGNORET) FERNALD, Cat. Coccoidea of the World (1903), 168.

Coccus longulus (DOUGLAS) FERNALD, Cat. Coccoidea of the World (1903), 171; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 180.

Coccus elongatus COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 428.

Female pale yellow, slightly convex, very elongated, transversely arched, slightly ridged when dry, 4 to 5 millimeters long, 2 to 2.5 millimeters broad; surface marked by oval derm cells like *S. hemisphaerica*; anal plates broadly triangular; legs ordinary, slightly longer than antennae; antennae 8-jointed, three the longest, two, four, five, and eight subequal (Plate I, fig. 10); marginal hairs slender and pointed.

According to Sanders, *C. elongatus* and *C. longulus* cannot be separated. A slight variation may be found in the antennae; otherwise the species seem to be the same.

Luzon, Tayabas, Lucban (Townsend), on *Codium variegatum*; Laguna, Los Baños (Baker), on *Anona squamosa*.

Coccus diversipes Cockerell.

Coccus diversipes COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 130.

Female scale flat, broad-oval, anterior end narrowest, about 2.5 millimeters long, 2 millimeters broad; light reddish brown; surface marked with many large polygonal areas within which are one or more small areas of the same general form; regions between these with numerous gland spots which appear black; anal plates long and narrow; anterior legs ordinary, middle and hind legs very slender and elongated with large coxae; antennae 6-jointed, measured in microns: (1) 30, (2) 87, (3) 97, (4) 27-30, (5) 25-27, (6) 55 (Plate II, fig. 21); marginal

hairs strongly fimbriate or branched. Apparently joints three and four are more or less united in some specimens, since 7-jointed specimens have been found in the type material. (From the original description.)

Luzon, Tayabas, Lucban (Townsend), on *Asplenium nidus*.

Coccus viridis (Green).

Coccus viridis (Green) FERNALD, Cat. Coccidae of the World (1908), 174; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 428.

Adult female bright pale green, oval, often asymmetrical, moderately convex, skin soft, 2.5 to 3.25 millimeters long, 1.5 to 2 millimeters broad; stigmatic clefts small and inconspicuous, three stigmatic spines stout and pointed, median twice as long as the other two; margin with short curved hairs divided at the ends; antennæ 7-jointed (Plate I, fig. 12); legs moderately stout, claw stout and curved; plates of anal opening triangular, concave, anal ring with eight hairs. Female ovoviparous. "Male unknown in any state." (Green.)

Luzon, Laguna, Los Baños (Baker), on *Antidesma bunius*, *Citrus decumana*, *Citrus nobilis*, *Gardenia florida*, and *Strychnos nurvomica*.

DIASPINÆ

Synoptic table of the genera.

- a'. Caudal margin of female with a single, entire, median lobe (Plate III, fig. 1) Odonaspis.
- a'. Caudal margin with at least two median lobes (Plate IV, fig. 6).
 - b'. Median lobes of caudal margin divergent and serrate on the inner edges (Plate III, figs. 3, 5, and 18).
 - c' Adult female inclosed in the enlarged second secretion; one exuvia at narrow end, little of true scale present (Plate III, fig. 4). Fiorinia.
 - c'. Not so, more than one exuvia at narrow end (Plate III, figs. 9, 12, and 14).
 - d'. Exuviae of scale within the margin, scale always circular; second stage female with the scale shaped as in *Phenacaspis* (Plate III, figs. 9, 10, and 12). Aulacaspis.*
 - d'. Exuviae marginal, outline of scale subcircular, pyriform, or elongated (Plate III, figs. 12 and 14). Phenacaspis.*
- b' Not so.
 - c' Female with slender, elongated, chitinous processes extending inward from bases of lobes (Plate IV, figs. 1 and 3). Chrysomphalus.
 - c'. Chitinous processes short or absent, or if longer, clubbed.
 - f' Entire margin of adult female deeply incised, with lobes between the incisions (Plate IV, fig. 7) Schizaspis.
 - f'. Entire margin without such incisions.
 - g'. Two rows of isolated pores near caudal margin of female (Plate IV, fig. 9) Pariatoria.

g'. Not so.

h¹. Female with a deep constriction between thorax and abdomen (Plate IV, fig. 18) *Selenaspisidus*.

h². Not so.

i¹. Female scale circular or nearly so (Plate V, figs. 4 and 9).

i². Female scale with exuviae at or near the center; caudal margin often with a single pair of lobes (Plate V, figs. 1, 4, and 7) *Aspidiotus*.

j¹. Female scale with exuviae sublateral or lateral; caudal margin with three or four pairs of lobes, caudal area often with a reticulated portion (Plate IV, fig. 9). *Pseudacnidia*.*

j². Female scale always elongate (Plate V, fig. 12; Plate VI, fig. 8).

k¹. Median lobes separated, usually with spines between; female scale mytiliform (Plate V, figs. 13 and 14). *Lepidosaphes*.

k². Median lobes usually close together (Plate VI, figs. 7 and 14).

l¹. Male scale white, differing from that of female; median lobes darker than others, margins dentate or crenulate (Plate VI, figs. 6, 9, and 10) *Hemichionaspis*.*

l². Male and female scales usually brown; median lobes no darker than others, notched (Plate VI, figs. 11, 13, and 14) *Pinnaspis*.*

* The particular characters of *Hemichionaspis* and *Aulacaspis* seem to establish few differences between the two genera; the scales of the species of *Hemichionaspis* are difficult to distinguish from those of *Aulacaspis*, there are few differences in the characters of the females.

The distinctions between *Aspidotus* and *Pseudacnidia* are inadequate for an accurate determination. One acquainted with the species of each genus can recognize the differences, but the contrasting characters are not definite.

A difference based upon the caudal margins might suffice to separate *Hemichionaspis* and *Pinnaspis*, the scales of the two genera are confusing. Lindner places *Hemichionaspis* as a synonym of *Pinnaspis*.

Genus ODONASPIS Leonardi

Type, *Aspidotus serrata* Cockerell.

Female scale circular, often elongated. Adult female with a single or no lobe on the caudal margin; circumgenital glands grouped in various ways; anal orifice often far from the end.

Odonaspis schizostachyi Cockerell and Robinson.

Odonaspis schizostachyi COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1914), 33, 827.

Female scale circular, little over 1 millimeter in diameter, dull white, first skin pale yellow. Adult female round; caudal margin with a large median lobe free from indentations, second and third lobes each bilobed, third much lower than second, both without indentations; two spinelike plates laterad of

median and second lobes; the base of the second lobe is prolonged cephalad into a fingerlike process continuous with a striated band terminating at the anal plate (Plate III, fig. 1). The lateral margins indented, marking five sutures along which are single rows of minute quadrate scales with serrate apical margins (Plate III, fig. 2). Circumgenital glands in two groups, each of about 150 orifices.

Luzon, Laguna, Los Baños (*Baker*), on *Schizostachyum acutiflorum*. The colonies of this scale are usually completely covered by the thick, felted, brown masses of a fungus, *Septobasidium bakeri* Patouillard.

Genus FIORINIA Targioni Tozzetti

Type, *Diaspis fioriniae* Targioni Tozzetti.

Female scale with second exuvia covering the female; scale narrow at anterior end, widens and the sides are parallel, first skin at cephalic end. Scale of male similar to that of female, smaller.

Synoptic table of the species.

- a'. Median lobes of caudal margin prominent, second and third pairs smaller; posterior lateral circumgenital glands connected by a line of glands (Plate III, fig. 8) fioriniae.
- a'. Median lobes prominent, without distinct additional lobes, margin with triangular projections; circumgenital glands in five distinct groups; second stage female with caudal margin similar to that of *F. fioriniae* (Plate III, figs. 5 and 6) phantasma.

Fiorinia fioriniae (Targioni Tozzetti).

Fiorinia fioriniae (TARGIONI TOZZETTI) FERNALD, Cat. Coccidae of the World (1903), 246; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 426.

Female scale elongated, 1 millimeter long, 0.25 millimeter wide, sides slightly curved; second skin inclosing adult, yellowish brown, exuvia at anterior end pale yellow (Plate III, fig. 4). Adult female with abdominal segments contracted during gestation (Plate III, fig. 7); median lobes of caudal margin widely divergent, regularly and finely serrate on inner margins, second and third pairs each of two lobules, margins rounded and entire (Plate III, fig. 3). Circumgenital glands in five groups, median and anterior laterals confluent, made up of 25 to 30 orifices, posterior laterals of 12 to 17 orifices.

Adult male unknown. (Newstead.)

Luzon, Laguna, Los Baños (*Baker*), on *Celtis philippinensis*.

***Fiorinia phantasma* Cockerell and Robinson.**

Fiorinia phantasma COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 24, 108.

Female scale elongate, about 1.25 millimeters long, pale grayish ochreous; first skin elongate-oval, extending beyond anterior end. Adult female with abdominal segments contracted during gestation; median lobes widely divergent, inner margin with four to six teeth; no distinct additional lobes, but the margin with triangular projections; two spines laterad of median lobes (Plate III, fig. 5). Circumgenital glands: Posterior laterals of 10 to 13 orifices; anterior laterals, 10; median, 5. Second stage female not unlike *F. floriniae* (Plate III, fig. 6).

Male scale white, sides parallel, broad, with pale yellowish first skin.

Luzon, Laguna, Mount Maquiling (*Baker*), on *Machilus* (by mistake recorded as *Neolitsea*).

Genus AULACASPIS Cockerell

Type, *Aspidiotus roseæ* Bouché.

Scale of female pyriform or subcircular, exuviae terminal at the margin or slightly within it. Median lobes of caudal area divergent and serrulate. Male scale white, carinate.

***Aulacaspis roseæ* (Bouché).**

Aulacaspis roseæ (BOUCHÉ) FERNALD, Cat. Coccidae of the World (1903), 236; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 134.

Female scale subcircular, convex, 2 to 2.5 millimeters in diameter, opaque white, exuviae lateral to subcentral, yellow to brown (Plate III, fig. 9). Adult female broadly pyriform, anterior segments pronounced; median lobes of caudal margin long, widely divergent, inner margins finely dentate, apex rounded, two short spines between the median lobes, two similar spines on the surface of each; a spinelike plate and pointed glandular process laterad of median lobes; second pair of lobes of two short and rounded lobules with margins entire, followed by a spinelike plate; third pair of lobes similar to the second (Plate III, fig. 8). Circumgenital glands: Median, 11 to 33 orifices; anterior laterals, 17 to 40; posterior laterals, 14 to 40. Three rows of dorsal, tubular spinnerets on each side.

Male scale 1 millimeter long, white, tricarinate, exuviae yellow to brown.

Luzon, Tayabas, Lucban (*Townsend*), on *Rosa*.

Genus PHENACASPIS Cooley and Cockerell

Type, *Chionaspis nyssae* Comstock.

"Scale of female elongated, with the exuviae at the anterior extremity, white. Scale of male much smaller than that of female; elongated with the sides nearly parallel. Pygidium with the terminal pair of lobes more or less sunken into the body, and having their inner edges serrate or crenate, and strongly divergent leaving a notch on the median line. The color and shape of the scales of the two sexes, together with the median notch of the pygidium are the essential characters of the genus." (Cooley.)

Synoptic table of the species.

- a'. Caudal margin of female with one pair of lateral lobes (Plate III, fig. 11) *inday*.
- According to the available literature, the median lobes are distinguishable, but second and third lobes are indicated by prominences *eugeniae*.
- a'. Caudal margin with two pairs of lateral lobes (Plate III, fig. 13).
- b'. Female scale transparent and thin.
 - c'. Female scale circular; groups of lateral circumgenital glands contiguous and almost confluent *mischoearpi*
 - c'. Female scale elongate; groups of glands distinctly separate.
- b'. Female scale opaque.
 - d'. Female scale nearly 3 millimeters in diameter; thorax enlarged and lobed (Plate III, fig. 16) *thoracica*.
 - d'. Female scale not more than 2 millimeters in diameter; thorax not enlarged *pallida*.

Phenacaspis inday (Banks).

Chionaspis candida (not of Green) BANKS, Phil. Journ. Sci. (1906), 1, 222, Pl. 4, figs. 1-5.

Chionaspis inday BANKS, Phil. Journ. Sci. (1906), 1, 787; SANDERS, Bull. U. S. Dept. Agr., Bur. Ent., Tech. Ser. (1909), No. 16, pt. 3, 48.

Female scale elongate-oval, widened posteriorly, about 2.5 millimeters long, 1.20 millimeters broad, white, exuviae pale (Plate V, fig. 12). Adult female with abdominal segments lobed; median lobes of caudal margin divergent, minutely dentate, followed by a spinelike plate and a low triangular plate; two lobules of second lobes low and rounded, followed by a spinelike plate (Plate III, fig. 11). Circumgenital glands with median group of 8 orifices, anterior laterals of 14 to 19, posterior laterals of 14 to 16. Male scale white woolly, carinae scarcely definable; about 1 millimeter long. (From the original description.)

This is very similar to *P. dilatata* Green; it may be separable on account of the difference in shape of male and female scales; the median lobes of *P. inday* (Banks) are longer and more divergent. It is probable that this species should be considered as belonging to *Phenacaspis* rather than to *Chionaspis*.

LUZON, Manila (Banks), on *Cocos nucifera*; Laguna, Los Baños (Baker), on *Mangifera indica*.

Phenacaspis eugeniae (Maskell).

Phenacaspis eugeniae (MASKELL) FERNALD, Cat. Coccidae of the World (1903), 238; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 184.

Female scale elongate-oval, about 0.75 millimeter in diameter, white. Caudal margin of adult female with divergent median lobes, edges serrate; a spinelike plate laterad of these lobes, two other lobes represented by broad prominences, each bearing a spine. Circumgenital glands with median group of 6 to 8 orifices, anterior laterals of 16 to 18, posterior laterals of 18 to 20.

LUZON, Manila (Townsend), on a palm.

This species has not been definitely recorded from the Philippine Islands. Cockerell remarks that a specimen collected by Townsend "seems to be *P. eugeniae*."

Phenacaspis mischocarpi Cockerell and Robinson.

Phenacaspis mischocarpi COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1914), 33, 328.

Female scale circular, about 1.75 millimeters in diameter, dull white, exuviae lateral, pale orange, projecting beyond the margin of the scale (Plate III, fig. 14). Female elongated, broadened anteriorly, conspicuously segmented; caudal margin with median lobes strongly divergent, serrulate on inner margins; second and third lobes each of two separate rounded lobules; a spinelike plate and triangular projection laterad of median and second lobes, a heavy spinelike plate laterad of third lobes, three others on the margin beyond; margin beyond the lobes irregularly dentate and with four incisions having thickened edges (Plate III, fig. 13). Circumgenital glands with median group of 8 or 9 orifices, lateral groups each of 16 or 17 orifices, the anterior and posterior groups contiguous, almost confluent.

Male scale about 1 millimeter long, tricarinate, exuvia pale yellow.

LUZON, Laguna, Los Baños (Baker), on *Mischocarpus fuscescens*.

Phenacaspis pellucida sp. nov.

Female scale slightly elongated, about 2 millimeters long, or 1.5 millimeters in diameter, white, transparent, and thin, showing the shriveled insect beneath; exuviae terminal; yellow to brown, second skin broad-oval, first skin projecting beyond scale. Adult female pale yellow, almost colorless, oval, broadest across the middle; abdominal segments apparent; caudal area with median lobes slightly darker, moderately divergent, rounded, with six to eight teeth on the inner edges, not produced to level of other lobes; second and third lobes each composed of two rounded lobules; a pointed glandular process laterad of median and second lobes; a well-developed spinelike plate laterad of each lobe; margin beyond lobes serrate with an incision and a spinelike plate (Plate III, fig. 15). Circumgenital glands with median group of 7 or 8 orifices, anterior laterals of 19 or 20, posterior laterals of 11 to 16. A few dorsal tubular spinnerets.

Male scale white, sides parallel, distinctly tricarinate, exuviae pale yellow; about 1 millimeter long.

Luzon, Laguna, Los Baños (*Baker*), October, 1915, on *Macaranga tanarius*.

All of the species listed in the above table having three pairs of lobes resemble *Phenacaspis varicosa* Green in the general characters of the caudal margin. However, *P. pellucida* seems to be distinct owing to its thin, transparent, and smaller scale. The same characters distinguish it from *P. chinensis* Ckll. The male scales and circular female scales of *P. latissima* Ckll., the oval pores of *P. strobilanthi* Green, and the very large lobes of *P. megaloba* Green, respectively, differentiate them from this species.

Phenacaspis thoracica sp. nov.

Female scale circular, 2.5 to 2.75 millimeters in diameter, flat, opaque, white; exuviae yellow, first skin scarcely projecting beyond the margin, second skin broad-oval. Adult female brownish, elongated, thorax protruding, with lateral prominences, abdomen regularly and conspicuously segmented (Plate III, fig. 16); on each side of the mouth a gland with oval pores; median lobes of caudal margin divergent, rounded, finely dentate on inner sides, produced to level of other lobes, very little darker; second and third pairs of lobes each composed of two rounded lobules; a pointed glandular process laterad of median and second lobes; a well-developed, spinelike plate laterad of each lobe; margin beyond dentate, resembling *P. mischocarpi* (Plate III,

fig. 17). Circumgenital glands with median groups of 9 or 10 orifices, anterior laterals of 18 to 21, posterior laterals of 17 to 26. A few dorsal tubular spinnerets in rows.

Male scale white, sides parallel, distinctly tricarinate, exuviae pale yellow; 1 millimeter long.

Luzon, Laguna, Los Baños (*Baker*), December, 1915, on *Morinda bracteata*.

The caudal area of *P. thoracica* resembles that of *P. varicosa* Green, but the scale lacks the ridges of *P. varicosa* Green. The peculiar shape of the female seems to differentiate this species from similar species, such as *P. chinensis* Ckll. and *P. latissima* Ckll.

Phenacaspis pallida sp. nov.

Female scale circular, white and opaque, slightly convex, occasionally with a few irregular raised lines, 1.75 millimeters in diameter; marginal exuviae pale yellow, second skin broad-oval. Adult female elongate, broadened anteriorly; yellowish brown; often with base of abdomen contracted within the thorax; abdominal segments well defined; median lobes of caudal area widely divergent, serrate, little darker than the others, not produced to level of other lobes; second and third pairs of lobes each composed of two separate rounded lobules; a pointed glandular process laterad of median and second lobes; a well-developed spinelike plate laterad of each lobe; margin beyond serrate with four widely separated, short incisions and three spinelike plates (Plate III, fig. 18). Circumgenital glands with median group of 12 orifices, anterior laterals of 22 or 23, posterior laterals of 14 to 16. A few dorsal tubular spinnerets present.

Male scale white suffused with brown, sides parallel, a single median carina, about 0.75 millimeter long.

Luzon, Laguna, Los Baños (*Baker*), March, 1915, on *Litsea*.

Although the caudal margin of *Phenacaspis pallida* resembles that of *P. varicosa* Green, the smaller size and inconspicuous and occasional ridges of the female scale seem to differentiate it. This species has the general characters of *P. latissima* Ckll., which is larger; and of *P. chinensis* Ckll., the scale of which has a different form and orange exuviae.

Genus **CHRYSONOPHALUS** Ashmead

Type, *Coccus aonidum* Linnaeus.

Female scale circular, exuviae nearly central; last segment of the female with three pairs of well-developed lobes, with elongated thickenings of the body wall terminating at the bases of the lobes; circumgenital glands present.

Synoptic table of the species.

- a'. Adult female with abdomen contracted within the body, thorax extending back in a large rounded lobe on each side, which projects beyond the extremity of the abdomen (Plate IV, fig. 2) *aurantii*.
- a'. Caudal margin slightly or not at all contracted within the body.
 - b'. Dorsal thickenings of caudal margin shorter than median lobes (Plate IV, fig. 3) *pedroniformis*.
 - b'. Not so.
 - c'. Lobes of caudal margin notched on outer edges; circumgenital glands with anterior lateral groups of 4 to 8 orifices, posterior lateral groups of 2 to 4 orifices; male scale similar to female (Plate IV, fig. 4) *aconidium*.
 - c'. Caudal lobes with a single notch or tricuspid; circumgenital glands more numerous; male scale paler than female (Plate IV, fig. 5).
..... *rossi*.

Chrysomphalus pedroniformis Cockerell and Robinson.

Chrysomphalus pedroniformis COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 107, 427.

Female scale circular or oval, 1.75 millimeters in diameter, slightly convex, dull pale reddish brown; exuviae central to sublateral, darker than rest of scale, first skin appearing as a more or less golden boss. Adult female almost circular, at period of gestation abdomen partly contracted within the body; median and second lobes of caudal margin with a notch on each side or second lobes may lack the inner notch, third lobes with a single notch on the outer edge; fringed plates between the lobes; a short spine laterad of each lobe (Plate IV, fig. 3). Circumgenital glands with anterior lateral group of 5 to 8 orifices, posterior lateral group of 3 to 5. Dorsal pores in two rows on each side.

Male scale elongate-oval, pale with darker exuviae.

Luzon, Bataan (Mackie), on *Eriodendron anfractuosum*; Laguna, Los Baños (Baker), on *Vitis vinifera*.

Malenotti³ considers this too near to *Aspidiotus orientalis* News. to be regarded as a distinct species. Lindinger has regarded *A. orientalis* as a *Chrysomphalus*.

Chrysomphalus aurantii (Maskell).

Chrysomphalus aurantii (MASKELL) FERNALD, Cat. Coccidae of the World (1903), 287; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 184.

Female scale circular, flat, about 1.5 millimeters in diameter; yellowish brown, exuviae central, yellow, dull or shining. Female when fully developed with thorax extending backward in a

rounded lobe on each side, projecting beyond extremity of abdomen (Plate IV, fig. 2). Caudal margin with three pairs of well-developed lobes, median lobes notched on each side, second lobes similar, third lobes with a single notch on the outer edge; laterad of each lobe and between median lobes are deeply fringed plates slightly longer than the lobes (Plate IV, fig. 1). Two groups of tubular spinnerets; four irregular rows of dorsal pores.

Male scale oblong; same color and texture as female; 0.75 millimeter long.

Luzon, Manila (Townsend), on *Artocarpus*; Laguna, Mount Maquiling (Baker), on *Astronia*.

Chrysomphalus conidum (Linnaeus).

Chrysomphalus conidum (LINNAEUS) FERNALD, Cat. Coccidae of the World (1908), 286; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 184; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Chrysomphalus propinquus BANKS, Phil. Journ. Sci. (1906), 1, 230.

Female scale circular, about 2 millimeters in diameter, slightly convex, reddish or grayish brown to black; exuviae nearly central, yellow to dark brown. Adult female nearly circular; caudal margin with three pairs of well-developed lobes all notched on the outer edges, median lobes slightly notched on the inner edges; fringed plates between each lobe (Plate IV, fig. 4). Circumgenital glands with anterior lateral groups of 4 to 8 orifices, posterior lateral of 2 to 4. Two double irregular rows of dorsal pores. Male scale ovate, of same color and texture as female; 1 millimeter long.

Luzon, Manila (Townsend), on *Artocarpus* and on a palm, (Banks), on *Cocos nucifera*; Laguna, Mount Maquiling (Baker), on a climbing aroid; Los Baños (Baker), on *Arenga saccharifera*, *Citrus nobilis*, *Cocos nucifera*, and *Garcinia*.

Chrysomphalus rossi (Maskell).

Chrysomphalus rossi (MASKELL) FERNALD, Cat. Coccidae of the World (1908), 293; COCKERELL, Proc. Acad. Nat. Sci. Phila. (1899), 274; Proc. Davenport Acad. Sci. (1905), 10, 184.

Female scale circular or irregularly oblong, 2 to 2.5 millimeters in diameter, slightly convex, dull red-brown to black; exuviae central, yellow, often appearing darker than rest of the scale. Caudal margin of female with three pairs of lobes, each with a notch on the outer edge or obscurely trilobed; fringed plates between each lobe, only slightly longer than lobes (Plate IV, fig. 5). Circumgenital glands with anterior laterals of 9 to 12

orifices, posterior laterals of 8 or 9. Numerous filiform tubular spinnerets.

LUZON, Tayabas, Lucban (*Townsend*), on *Arenga saccharifera* and *Cycas circinalis*; Manila, on an orchid quarantined by Mr. A. Craw at San Francisco.

This was the first coccid to be recorded from the Philippine Islands.

Genus SCHIZASPIS Cockerell and Robinson

Type, *Schizaspis lobata* Cockerell and Robinson.

Female scale small, almost circular, flattened; exuviae large. Adult with margins deeply incised, lobed between the incisions; no circumgenital glands; anal orifice large, near hind end; lobes and fringed plates well developed. Immature female oval, not lobed at sides. Male scale elongate, but not parallel-sided, white with yellow terminal exuviae, not keeled.

Schizaspis lobata Cockerell and Robinson.

Schizaspis lobata Cockerell and Robinson, Bull. Am. Mus. Nat. Hist. (1915), 34, 423.

Female scale nearly circular, about 0.75 millimeter in diameter, flat, yellowish brown, surface beaded with prominences in concentric rows; exuviae sublateral or central, dull golden yellow. Adult female about 0.5 millimeter in diameter, circular, with seven deep constrictions, the margin between them convex (Plate IV, fig. 7); caudal margin with median lobes stout, having three almost equal notches, second lobes prominent, round projections shorter than the median lobes; between the median lobes two fringed plates, laterad of these lobes a spine and two fringed plates, laterad of the second lobes a fringed plate and a series of spinelike plates, a short spine tips the second lobe (Plate IV, fig. 6). Anal orifice large, not far from hind end.

Male scale nearly 1 millimeter long, white with yellow exuviae.

LUZON, Laguna, Los Baños (*Baker*), on *Ficus nota*.

Genus PARLATORIA Targioni Tozzetti

Type, *Coccus ziziphus* Lucas.

"Species of which the scale of the female is long, narrow at the base, then enlarging suddenly; the exuviae of a rounded oval form. The margin of the anal segment is indented and presents in each notch some platelike scales. On the upper side near the margin are two rows of isolated pores. The scale of the

made of the same color as that of the female and much smaller." (Comstock.)

Synoptic table of the species.

- a'. Female scale black ziziphus.
- a'. Not so.
- b'. Adult female elongated; caudal margin without a rudimentary fourth lobe (Plate IV, fig. 9) proteus.
- b'. Adult female circular or subcircular.
- c'. Female scale slate-colored; fourth lobe of caudal margin dentate with a sharp terminal cusp (Plate IV, fig. 10) greeni.
- c'. Female scale light yellow; rudimentary lobe a pointed prominence of body wall bearing a spine (Plate IV, fig. 11) pergandei.

Parlatoria ziziphus (Lucas).

Parlatoria ziziphus (LUCAS) FERNALD, Cat. Coccidae of the World (1903), 322; SASSNER, Journ. Econ. Ent. (1913), 6, 218.

Parlatoria zizyphus COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 426.

Female scale elongate-oval, 1.75 millimeters long, 0.75 millimeter wide, black, exuviae at anterior margin. Female insect oval; caudal margin with four pairs of lobes, first three pairs subequal and slightly tricuspid, fourth lobes narrow and pointed; fringed plates between the lobes (Plate IV, fig. 8). Margin with short tubular spinnerets. Four groups of circumgenital glands, anterior laterals of 6 or 7 orifices, posterior laterals of 8 to 10.

Male scale white, exuviae black; 1 millimeter long.

LUZON, Laguna, Los Baños (*Baker*), on *Citrus decumana*.

Recorded by Sassner on *Citrus* cuttings from the Philippine Islands.

Parlatoria proteus (Curtis).

Parlatoria proteus (CURTIS) FERNALD, Cat. Coccidae of the World (1903), 320; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 194.

Female scale elongate-oval, 1 to 1.75 millimeters long, 0.50 to 0.75 millimeter broad, convex, greenish yellow to grayish brown; exuviae at anterior margin dark yellow, second skin yellow to brown. Adult female oval; caudal margin with three pairs of lobes similar to those of *P. ziziphus*, plates between the lobes also similar, no rudimentary fourth lobes (Plate IV, fig. 9). Circumgenital glands in four groups, anterior laterals 7, posterior laterals 4.

Male scale elongate, sides parallel, 1 millimeter long, resembles female scale in color and texture.

LUZON, Manila (*Townsend*), on *Eugenia malaccensis*.

Parlatoria greeni Banks.

Parlatoria greeni BANKS, Phil. Journ. Sci. (1906), 1, 231.

Female scale broad-oval, 1.35 to 1.65 millimeters long, pale to dark slate; exuviae at anterior end yellow. Female broadly elliptical; three pairs of lobes on margin similar to those of *P. ziziphus*, rudimentary fourth lobes, distinct dentate projection half the length of the other lobes. Fringed plates between the lobes (Plate IV, fig. 10). Posterior lateral circumgenital glands of 5 orifices, anterior laterals of 6. Male scale 0.87 millimeter long, 0.26 millimeter wide, sides parallel, carinate, white. (From the original description.)

Luzon, Manila (Banks), on *Cocos nucifera*.

Parlatoria pergandii Comstock.

Parlatoria pergandii COMSTOCK, FERNALD, Cat. Coccidae of the World (1908), 319; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 184; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 426.

Female scale circular to elongate, 1 to 1.75 millimeters long, pale red-brown; exuviae brown or yellow. Adult female broadly oval; caudal margin with three pairs of lobes and fringed plates similar to those of *P. ziziphus*; fourth pair broad and flat, bearing a spine (Plate IV, fig. 11). Circumgenital glands with anterior laterals of 6 orifices, posterior laterals of 5.

Male scale similar to *P. proteus*; scale brown, exuviae yellow.

Luzon, Manila (Townsend), on an aloe-like plant; Laguna, Los Baños (Baker), on *Celtis philippinensis*.

Genus **SELENASPIDUS** Cockerell

Type, *Aspidiotus articulatus* Morgan.

Female scale flat, almost circular; exuviae central or subcentral; female with a deep constriction between cephalothorax and abdomen.

Selenaspidus articulatus (Morgan).

Selenaspidus articulatus (MORGAN) FERNALD, Cat. Coccidae of the World (1908), 284.

Pseudoaonidus articulatus (MORGAN) SASSER, Journ. Econ. Ent. (1916), 9, 218.

Female scale pale brown or yellow-brown, flat, almost circular, 2 to 2.25 millimeters in diameter; exuviae central to subcentral, yellow. Adult female with a marked division between thorax and abdomen (Plate IV, fig. 13); caudal area with median lobes rectangular, outer margins faintly notched, second pair broader,

margin sloping with a slight notch or bidentate; two bifurcate plates between lobes, palmate plates laterad of second lobes, beyond these is a conspicuous spiny process (Plate IV, fig. 12). Dorsal tubular spinnerets about 55 on each side. Circumgenital glands in two lateral groups each of 6 to 8 orifices. [From Newstead, Monograph of British Coccidae (1905), 1, 127.]

Found on citrus cuttings, Philippine Islands.

Genus ASPIDIOTUS Bouché

Type, *Chermes hederae* Vallot.

Scale of female circular or nearly so, exuviae at or near the center, scale of male somewhat elongated with larval skin at one side of center or near one edge. Caudal margin of female varies. *Hemiberlesia* Leonard, a subgenus, includes those species in which the second and third pairs of caudal lobes are smaller or absent and the anal opening is very large. The type of *Hemiberlesia* is *Aspidiotus rapax* Comstock.

Synoptic table of the species

a¹. Circumgenital glands present.

b¹. Caudal margin of female similar to that of *A. rupax* (Plate V, figs. 1 and 7); scale translucent white or gray.

c¹. Female scale circular, exuviae dark brown to black *cydoniae*.

c². Female scale similar to *A. cydoniae*, exuviae yellow to green, slightly lateral *cydoniae greenii*.

c³. Female scale slightly elongated, clear yellow to creamy white, central exuviae large and yellow. *lataniae*.

b². Caudal margin not so.

d¹. Median lobes of caudal margin more than twice as large as others; cephalad of median lobes a conspicuous thickening about as long as the lobes (Plate V, fig. 2) *seryphae*.

d². Not so; female scale transparent white or yellow.

e¹. Adult female circular; caudal margin with four pairs of lobes often distinguishable (Plate V, fig. 3) *destructor*.*

e². Adult female pyriform; caudal margin with three pairs of lobes, each set on a projection of the margin (Plate V, fig. 5). *translucens*.*

a². Circumgenital glands absent.

f¹. Female scale flat, dark ferruginous, second lobes of caudal margin similar to, but smaller than, median lobes (Plate V, fig. 6). *tayabanus*.

f². Female scale convex, gray or yellowish; only median lobes well developed (Plate V, fig. 7) *rapax*.

* The difficulties in separating *Aspidiotus destructor* and *A. translucens* are obvious. Ettore Malenotti, in a recent paper, concludes that they are extremes of variation of a single species, which is to be called *A. destructor*. It appears that E. E. Green is of the same opinion.

***Aspidiotus cydoniae* Comstock.**

Aspidiotus cydoniae COMSTOCK, FERNALD, Cat. Coccidae of the World (1908), 256.

Female scale circular, 1.5 millimeters in diameter, convex, gray; exuviae subcentral, marked by a brown spot. Adult male circular; median lobes of caudal margin with a notch on each side, second and third lobes represented by thickenings of the body wall or slight projections; simple plates between median lobes, five fringed plates laterad of these lobes; short spines laterad of the lobes and thickenings (Plate V, fig. 1). Circumgenital glands with anterior laterals of 8 or 9 orifices, posterior laterals of 5 to 7.

Luzon, Laguna, Los Baños (*C. F. Baker* and *F. Muir*), on *Blumea balsamifera* and *Hibiscus mutabilis*.

***Aspidiotus cydoniae* var. *greenii* Cockerell.**

Aspidiotus cydoniae var. *greenii* COCKERELL, FERNALD, Cat. Coccidae of the World (1908), 256; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Very similar to *Aspidiotus cydoniae* in characters of the female and color of female scale, but the exuviae differ; however, the exuviae are similar to those of *A. latañiae*. The three are so much alike that they may be no more than varieties.

Luzon, Laguna, Los Baños (*Baker*), on *Achras sapota* and *Chrysanthemum*.

***Aspidiotus latañiae* Signoret.**

Aspidiotus latañiae SIGNORET, FERNALD, Cat. Coccidae of the World (1908), 266; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 133.

Female scale circular, 2 millimeters in diameter, flat; exuviae cream white, densely coated, but a yellow spot in the center of each scale. Median lobes of caudal margin large and prominent, notched on each side, notch on inner side often imperceptible; two deep incisions on each side with conspicuous, thickened chitinous rim; laterad of each thickening a pointed glandular process; two spines between the median lobes, fringed spines laterad of median lobes. Circumgenital glands with anterior laterals of 8 orifices, posterior laterals of 6 or 7 orifices. In every respect the characters of the caudal margin agree with those of *A. cydoniae*. (From Green and from the original description of Signoret.)

Luzon, Tayabas, Lucban (Townsend), on "cabbage." (Cabbage palm?)

Aspidiotus coryphae Cockerell and Robinson.

Aspidiotus coryphae COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 425.

Female scale circular, nearly 2 millimeters in diameter, flat, dull white or pale ochreous, exuviae sublateral, first skin exposed. Adult female pyriform, caudal margin with median lobes large and prominent, almost contiguous, rounded apically with a single notch on the outer edges, second and third lobes small and transparent, notched like the median lobes; a small fringed plate between median lobes, two fringed plates laterad of second lobes, three fringed plates between second and third lobes, six similar plates beyond third lobes; the usual spines at bases of lobes. A conspicuous thickening cephalad of each median lobe (Plate V, fig. 2). Anal orifice pyriform, pointed anteriorly. Circumgenital glands with anterior laterals of 7 to 9 orifices, posterior laterals of 6 to 8 orifices.

Luzon, Laguna, Los Baños (*Baker*), on *Corypha elata*.

Aspidiotus destructor Signoret.

Aspidiotus destructor SIGNORET, FERNALD, Cat. Coccidae of the World (1908), 257; BANKS, Phil. Journ. Sci. (1906), 1, 218.

Female scale circular, flat, 1.5 millimeters in diameter, yellowish or whitish; exuviae large, central, yellow (Plate V, fig. 4). Adult female circular; caudal margin with three pairs of lobes, often a fourth present, median lobes tricuspid or bicuspid, second and third lobes bicuspid, all nearly equal in length or with median pair slightly shorter; fringed plates between the lobes or beyond the third lobes (Plate V, fig. 3). Circumgenital glands with posterior laterals of 4 to 6 orifices, anterior laterals of 7 to 12. Filiform tubular spinnerets.

Male scale oblongate-oval, pale translucent, central exuvia darker yellowish.

Luzon, Laguna, Los Baños (*Baker*), on *Cocos nucifera*, *Eugenia calubcob*, *Mangifera indica*, and *Mangifera verticillata*.

Aspidiotus translucens Cockerell.

Aspidiotus similimus translucens COCKERELL, FERNALD, Cat. Coccidae of the World (1908), 278; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 133.

Aspidiotus translucens COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 106, 427.

Female scale circular, flat, 1.5 millimeters in diameter, yellowish white; exuviae nearly central, pale yellow. Adult female pyriform; caudal margin with six prominent lobes, median obscurely tricuspid, not so long as the second, second

and third slender, transparent, contracted at the base, notched on the outer edges; each lobe situated on a pointed prominence of the body wall; two slightly divided plates between median lobes, deeply notched plates laterad of the other lobes; a small spine at base of each lobe (Plate V, fig. 5). Circumgenital glands with anterior laterals of 6 to 11 orifices, posterior laterals of 4 to 6 orifices. Filiform tubular spinnerets present.

Male scale similar to female, smaller, oval, 1 millimeter long, 0.75 millimeter broad.

LUZON, Laguna, Los Baños (Baker), on *Anona squamosa*, *Aleurites moluccana*, *Carica papaya*, *Cocos nucifera*, *Codiaeum variegatum*, *Dioscorea alata*, *Mangifera indica*, *Musa sapientum*, *Psidium aruca*, *Spondias*, *Tamarindus indica*; Bataan, Lamas (Baker), on *Phoenix dactylifera*; Tayabas, Lucban (Townsend), on coconut seedling.

Aspidiotus tayabanus Cockerell.

Aspidiotus tayabanus COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 133.

Female scale flat, dark ferruginous, exuviae marked by a dot and ring in gray or yellowish white, second skin orange-ferruginous. Female reniform; median lobes of caudal margin large and elongated, the inner edges almost contiguous, apex rounded, outer edge with a strong notch; second lobes similar, but smaller and more pointed; spines large; beyond the second lobes are two pointed projections followed by three large, broad, strap-shaped plates slightly notched. Cephalad of the first and second lobes are two long club-shaped glands (Plate V, fig. 6). Dorsal pores small and few in number. (From the original description.)

LUZON, Tayabas, Lucban (Townsend), on *Gardenia* or *Jasminum*.

This is by no means a typical *Aspidiotus*.

Aspidiotus rapax Comstock.

Aspidiotus rapax COMSTOCK, FERNALD, Cat. Coecidae of the World (1908), 276; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Female scale and adult insect indistinguishable from *A. cydoniae*. Female insect only differs from *A. cydoniae* in the absence of circumgenital glands. The thickenings of the caudal margin do not take the form of definite projections (Plate V, fig. 7).

LUZON, Manila market (Baker), on oranges (*Citrus aurantium*) from southern California.

Genus **PSEUDAONIDIA** Cockerell

Type, *Apidiotus duplex* Cockerell.

Female scale moderately convex, subcircular, brownish black; caudal margin with three or four pairs of lobes, median lobes heavier, others narrower, fringed plates between the lobes; with or without a tessellated patch.

Synoptic table of the species.

- a'. Fourth lobes of caudal margin slightly developed (Plate V, fig. 8).
obsita.
- a''. Fourth lobes well developed (Plate V, figs. 10 and 11).
- b'. Caudal area with a reticulated patch, median lobes little darker than the others (Plate V, fig. 10) trilebitiformis.
- b''. Caudal area without a reticulated patch, median lobes darker and heavier than the others (Plate V, fig. 11) circuligata.

Pseudoaonidia obsita Cockerell and Robinson.

Pseudoaonidia obsita COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 109.

Female scale circular, about 2.5 millimeters in diameter, slightly convex, appearing brownish black, but the true color is brownish pink; exuviae yellowish fulvous, sublateral. Occasionally the scales are white. Adult female somewhat oval, segments distinct, abdomen with a large reticulated patch. Caudal margin with three pairs of lobes and a fourth rudimentary; median pair dark, notched on each side, slightly shorter than the others; second and third pairs pale, elongate, with a notch on the outer side; fourth lobes indicated by a subangular projection; squames between the lobes bidentate; a spine laterad of second and third lobes (Plate V, fig. 8). Circumgenital glands with anterior laterals of 27 to 29 orifices, posterior laterals of 33.

Male scale broad-oval, about 1.5 millimeters long, dull brownish pink, with pale orange first skin at one end.

Luzon, Laguna, Los Baños (*Baker*), on *Ficus condensifolia*.

Pseudoaonidia trilebitiformis (Green).

Pseudoaonidia trilebitiformis (GREEN) FERNALD, Cat. Cecidiae of the World (1903), 284; COCKERELL, Proc. Davenport Acad. Sci. (1905), 13, 134.

Female scale usually semicircular, 3 to 4.5 millimeters in diameter, almost flat, pale reddish brown; exuviae yellow (Plate V, fig. 9). Female insect hard and horny with transverse striated lines, oblong, segments well defined; caudal margin with eight obscurely tricuspid lobes, median stoutest but often not

so long as the others. Plates between the lobes deeply fringed, little longer than the lobes. On dorsal surface an extensive reticulated patch, spaces of irregular size and shape (Plate V, fig. 10). Circungenital glands with anterior laterals of 21 to 24 orifices, posterior laterals of 16 to 27. Tubular spinnerets present. (From Green.)

Luzon, Manila (Townsend), on *Artocarpus*.

Pseudaonidium circuliginis (Green).

Aspidiota circuliginis GREEN, Ent. Mont. Mag. (1904), 40, 208.

Pseudaonidium circuliguttis COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915). 34. 426.

Female scale nearly circular, 2.75 millimeters in diameter, black, exuviae yellow. Female insect also circular; median lobes of caudal margin notched on each side, heavy and dark, second and third lobes transparent and elongate, similarly notched, fourth lobes represented by a heavy projection of the body wall; narrow bidentate plates between the lobes (Plate V, fig. 11). Circumgenital glands in two confluent groups each of 30 to 33 orifices. A continuous thickened rim cephalad of the caudal lobes.

LUZON, Laguna, Los Baños (Baker), on *Corypha elata*.

Genus LEPIDOSAPHES Shimer

Type, *Coccus ulmi* Linnæus.

Female scale long, narrow, and usually curved. Caudal margin of female with heavy median lobes and second and third lobes consisting of two lobules; circumgenital glands usually present. Male scale resembles female in form and texture, not carinate.

Synoptic table of the species.

- a'. Female scale yellowish green or greenish yellow; exuviae orange, with a dark red longitudinal stripe..... *rubrovittatus*.

c'. Female scale darker, grayish brown to red-brown.

b'. Female scale broadened posteriorly.

b'. Female scale broadest across middle, often curved, uniform light brown *laevisanthus*.

c'. Female without circumgenital glands.

d'. Median lobes smaller than second pair (Plate VI, fig. 1).
..... *luzonica*.

d'. Median lobes larger than second pair (Plate VI, fig. 2) *ixormis*.

c'. Female with circumgenital glands.

e'. Female scale 3 to 4 millimeters long; median lobes of caudal margin entire, each forming a low semicircle (Plate VI, fig. 3).
..... *concolor*.

- e'. Female scale smaller; median lobes lobed on each side.
- f'. Median and second lobes of caudal area low and broad; female scale 2.5 to 2.75 millimeters long (Plate VI, fig. 4) .. *moggregori*.
- f'. Median and second lobes prominent; female scale 1.8 to 2 millimeters long (Plate VI, fig. 5) *unicolor*.

***Lepidosaphes rubrovittatus* Cockerell.**

Lepidosaphes rubrovittatus COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 185.

Lepidosaphes (Mytilaspis) fasciata GREEN, Journ. Econ. Biol. (1911), 6, 31, fig.

Female scale slender-elongate (Plate V, fig. 12), a peculiar greenish yellow; exuviae dull orange with a dark red longitudinal stripe down the middle of each skin. Adult female with three lateral segments produced; median lobes of caudal margin striate, slightly notched on each side, somewhat crenulate; third lobes rudimentary and scarcely noticeable; plates all spinelike and simple (Plate V, fig. 13). Circumgenital glands forming a letter V, median group of 3 orifices, anterior laterals of 7 to 8, posterior laterals of 4. Dorsal glands conspicuous, marginal oval gland orifices distinct. (From the original description.)

LUZON, Manila (*Townsend*), on *Eugenia malaccensis*.

***Lepidosaphes lasianthi* (Green).**

Lepidosaphes lasianthi (GREEN) FERNALD, Cat. Coccidae of the World (1903), 310.

Female scale pyriform, often curved, 2 to 2.75 millimeters long, 1 to 1.25 millimeters wide, uniform light brown; exuviae anterior, yellow. Adult female about 1 millimeter long, 0.5 millimeter wide; abdominal segments with prominent lobes; caudal margin with median lobes widely separated, broad, sloping to a blunt point, two spinelike plates between median lobes, a spinelike plate and pointed glandular process laterad of median lobes, second lobes rounded and slightly notched on the outer sides, followed by two spinelike plates (Plate V, fig. 14). Circumgenital glands with anterior laterals of 4 orifices, posterior laterals of 6, median of 4; according to some authorities the median and anterior laterals are confluent. A few dorsal tubular spinnerets present.

LUZON, Laguna, Los Baños (*Baker*), on *Codiaeum variegatum*.

***Lepidosaphes luzonica* sp. nov.**

Female scale brownish white or very pale brown, about 2 millimeters long, broadly elongated, slightly convex; exuviae light reddish brown. Adult female pale yellow; at period of gesta-

tion dark brown; abdominal segments bearing spinelike plates; broadened posteriorly. Caudal margin with small lobes; median lobes far apart, the interval occupied by two minute triangular projections; second lobes prominent, about three times as long as the median and similarly notched on each edge, with a low rounded or pointed projection on each side; two short and one long spinelike plate laterad of median lobes, second lobes followed by spinelike plates, varying in length and from two to three in number; notches of lobes vary; edge beyond carinate; caudal margin thickened cephalad of lobes (Plate VI, fig. 1). Circumgenital glands absent. A few dorsal pores near margin.

Male scale about 1.75 millimeters long, white, not carinate, sides nearly parallel; exuvia pale yellow; often occur in irregular masses.

Luzon, Benguet, Baguio (Baker, 1900), on *Ficus*.

The caudal margin resembles that of *Chionaspis colemani* Kuw., but the latter has circumgenital glands. The female scale is similar to *L. albus* Ckll., but the caudal margins are entirely different.

Lepidosaphes ixore Cockerell and Robinson.

Lepidosaphes ixore COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 425.

Female scale broadly elongate, somewhat convex, often curved, about 3.5 millimeters long, the surface with ridges diverging from a center near the exuviae; exuviae orange. Adult female elongate-oval, abdominal segments produced; laterally, bearing spines; median lobes broad, sloping to a blunt point, the edges minutely dentate; second lobes of two shorter rounded lobules, the first similar to the median lobes, slightly notched on each side, the second simple; third pair of lobes short and rounded; two spines and two spinelike plates between median lobes, two spinelike plates laterad of median lobes and three laterad of second and third lobes; basal margins of lobes thickened (Plate VI, fig. 2). Dorsal glands prominent.

Male scale nearly 2 millimeters long, rather broad, similar in texture to the female scale.

Luzon, Laguna, Los Baños (Baker), on *Ixora coccinea*.

Lepidosaphes coeculi (Green).

Lepidosaphes coeculi (GREEN) FERNALD, Cat. Coccidae of the World (1903), 307; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 185.

Female scale long and narrowly broadened posteriorly, 3 to 4 millimeters long, 0.75 millimeter broad, dark purple-brown, marked by curved lines of growth; ventral scale pitted; exuviae

yellow. Adult female with abdominal segments marked by prominent lateral lobes; caudal margin with two broad semicircular lobes separated by two spinelike plates and followed by two spinelike plates, two lobules of the second lobes rounded and entire, followed by two spinelike plates (Plate V, fig. 4). Dorsal tubular spinnerets absent or inconspicuous. Circumgenital glands in five groups; median of 5 or 6 orifices, anterior laterals of 8 to 13, posterior laterals of 6 to 8.

Male scale similar to female, smaller.

Luzon, Manila (*Townsend*), on a palm; Laguna, Los Baños (*Baker*), on *Erythropalum scandens*.

Lepidosaphes meggregori Banks.

Lepidosaphes meggregori BANKS, Phil. Journ. Sci. (1906), 1, 233

Female scale long and narrow, diverging posteriorly, 2.5 millimeters long, 0.75 millimeter broad, clear red-brown, exuviae yellow. Adult female elongate; median lobes of caudal margin low and broad with crenulate surface, rounded, lobed on each side; second pair with two lobules, somewhat flat, margins entire; two spinelike plates between median lobes, two laterad of second lobes (Plate VI, fig. 4). Dorsal pores irregular. Circumgenital glands with median group of 4 orifices, anterior laterals of 6, posterior laterals of 5 or 6. Male scale with anterior portions pale yellow-brown, posterior and lateral margins narrowly white, 1.45 millimeters long, 0.35 millimeter wide. (From the original description.)

Luzon, Manila (*Banks*), on *Cocos nucifera*.

Lepidosaphes unicolor Banks.

Lepidosaphes unicolor BANKS, Phil. Journ. Sci. (1906) 1, 234.

Female scale 1.8 millimeters long, 0.5 millimeter broad, sides nearly parallel; dark red, including the exuviae. Caudal margin of adult female with median lobes similar to those of *L. meggregori*, but not so flat; second pair rounded; fringed spinelike plates between median lobes and laterad of the others (Plate VI, fig. 5). Circumgenital glands scarcely separable into groups, 24 orifices in all, median 4 orifices somewhat distinct. (From the original description.)

Luzon, Manila (*Banks*), on *Cocos nucifera*.

Genus **HEMICHIONASPIS** Cockerell

Type, *Chionaspis aspidistra* Signoret.

Female scale pyriform or elongated and narrow. Female insect broadened posteriorly, conspicuously segmented. Caudal

area with one, two, or three pairs of lobes; median lobes with inner edges straight, parallel, and close together, often crenate and darker than the others; additional lobes of two lobules. Circumgenital glands always present. Male scale elongated, carinate.

Synoptic table of the species.

- a'. Female scale very narrow, almost linear; rich red-brown..... *uvaræ*.
- a'. Female scale elongate, broadened posteriorly, varying to almost circular.
 - b'. Caudal margin of female with second pair of lobes rudimentary (Plate VI, fig. 7)
 - b'. Caudal margin with second pair of lobes long and narrow (Plate VI, fig. 10)

Hemichionaspis uvaræ Cockerell and Robinson.

Hemichionaspis uvaræ COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1914), 33, 330.

Female scale very narrow, almost linear, about 1.5 millimeters long, rich red-brown, exuviae paler and yellower. Female greatly elongated, sides not prominently lobed, yellowish, turning green when boiled in KOH; median lobes of caudal area large and dark, together forming a semicircle, margins crenate or dentate with six small teeth; second lobes represented by two small lobules, the first rounded and the second pointed; beyond this a rudimentary prominence behind a spine; laterad of the spine a large spinelike plate; remainder of the margin divided into two or three flattened lobules, beyond which is a spinelike plate (Plate VI, fig. 6). Circumgenital glands with anterior and posterior laterals each of about 8 orifices, median of 4.

Male scale about 0.5 millimeter long, white, parallel-sided, with a slight median keel, larval skin pale orange-fulvous.

Luzon, Laguna, Los Baños (*Baker*), on *Uvaria* sp.

Hemichionaspis townsendi Cockerell.

Hemichionaspis townsendi COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 135.

Female scale pyriform, rather broad, varying to nearly circular, light grayish to yellowish, exuviae a little yellower. Female insect rather short, four large rounded prominences on each side, light yellowish with some blue pigment after boiling; median lobes contiguous, low and broad with four crenulations formed by three notches, the first being very deep and strong; second lobes rudimentary, scarcely rising above the general margin; first squames small and spinelike, the others (three single ones at rather long intervals and then a pair) very large and long (Plate VI, fig. 7). Circumgenital glands with median group of

about 16 orifices, anterior laterals of 19 to 20, posterior laterals of 25. Dorsal glands not numerous. Male scale white, bluntly tricarinate, exuvia pale yellowish. (From the original description.)

LUZON, Tayabas, Lucban (*Townsend*), on *Gossypium*.

Hemichionaspis aspidistra (Signoret).

Hemichionaspis aspidistra (SIGNORET) FERNALD, Cat. Coccidae of the World (1908), 239; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1914), 33, 328, fig. 8; (1915), 34, 107.

Female scale elongated, broadened posteriorly, 1.8 to 2.6 millimeters long, 0.75 millimeter wide, yellowish brown to brown, exuviae slightly brighter than the scale, whole scale often very thin. Female with abdominal segments prominent; caudal margin with first pair of lobes contiguous, with three distinct notches on the outer edge; second pair of lobes long and narrow, spatulate; a spinelike plate and glandular process laterad of median lobes (Plate VI, fig. 10). Circumgenital glands with median group of 5 to 15 orifices, anterior laterals of 15 to 22, posterior laterals of 17 to 23. Very few dorsal pores.

Male scale white, sides parallel, carinate, exuvia yellow, 1 to 1.8 millimeters long (Plate V, fig. 9). (From Cooley.)

LUZON, Laguna, Los Baños (*Baker*), on *Erythropalum scandens*; Benguet, Baguio (*Baker*), on *Piper*.

Genus PINNASPIST Cockerell

Type, *Aspidiodus buxi* Bouché.

Shape of female scale varies, being broadened posteriorly or across the middle or curved; second exuviae very large; caudal margin with two pairs of lobes, circumgenital glands present. Male scale similar to female.

Synoptic table of the species.

- a'. Median lobes prominent, rounded apically with deep notches on outer sides, double second lobes shaped like the blade of an ax (Plate VI, fig. 13) *siphonodontis*.
- a'. Median lobes with two deep notches on outer sides, second lobes similarly notched (Plate VI, fig. 14) *buxi*.

Pinnaspis siphonodontis Cockerell and Robinson.

Pinnaspis siphonodontis COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 110.

Female mytiliform, rather narrow, about 1.5 millimeters long, pale red-brown, somewhat translucent, shrunken female appearing as a dark spot. Female elongated; abdominal segments distinct, produced laterally into tubercles, caudal area with

median lobes prominent, almost contiguous, rounded apically with a deep notch on the outer edges, laterad of these is a spine-like plate, then a pointed projection; two lobules of second lobe shaped like the blade of an ax, also followed by a spinelike plate and a pointed projection; remainder of margin serrate with a few spinelike plates (Plate VI, fig. 13). Circumgenital glands with median group of 4 orifices, anterior laterals of 10, posterior laterals of 9 to 11.

Male scale about 0.5 millimeter long, parallel-sided, strongly tricarinate, brown (Plate V, fig. 18). A specimen of *P. siphonodontis* has been determined in which the male scale is white. It might be possible to have a male scale with a white variety.

Luzon, Laguna, Los Baños (*Baker*), on *Celtis philippinensis*, *Sandoricum koetjape*, and *Siphonodon celastrineus*.

Pinnaspis buxi (Bouché).

Pinnaspis buxi (Bouché) FERNALD, Cat. Coccidae of the World (1905), 242; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1914), 33, 329.

Female scale elongate, only slightly broadened posteriorly, often curved, 2 to 2.5 millimeters long, light brown, exuviae somewhat lighter. Adult female oval; median lobes of caudal margin with three terminal notches, sides parallel and almost contiguous, followed by a spine and a narrow glandular process, second lobe with the first lobule similar to the median lobes, second lobule rounded, followed by a glandular process and a spinelike plate (Plate VI, fig. 14). Circumgenital glands with anterior laterals of 9 to 10 orifices, posterior laterals of 10 to 12.

Luzon, Laguna, Los Baños (*Baker*), on *Homalonema philippinensis*.

HOST INDEX

<i>Achras sapota</i> Linn.	<i>Arachis hypogaea</i> Linn.
<i>Aspidiotus cydoniae</i> var. <i>greenii</i> Ckll.	<i>Pseudococcus virgatus</i> (Ckll.).
<i>Aleurites moluccana</i> (Linn.) Willd.	<i>Arenga saccharifera</i> Labill.
<i>Aspidiotus translucentis</i> Ckll.	<i>Chrysomphalus aurantii</i> (Mask.).
<i>Anona muricata</i> Linn.	<i>Chrysomphalus ressi</i> (Mask.).
<i>Sauvagesia hemisphaerica</i> (Targ.).	<i>Artocarpus</i> sp.
<i>Anona squamosa</i> Linn.	<i>Chrysomphalus aonidum</i> (Linn.).
<i>Aspidiotus translucens</i> Ckll.	<i>Chrysomphalus aurantii</i> (Mask.).
<i>Cocos elongatus</i> (Sigin.).	<i>Pseudoaonidia trilobitiformis</i> (Green).
<i>Pseudococcus virgatus</i> (Ckll.).	<i>Asplenium nidus</i> Linn.
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<i>Coccus viridis</i> (Green).	<i>Astronia</i> sp.
<i>Pulvinaria peridii</i> Mask.	<i>Chrysomphalus aurantii</i> (Mask.).
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<i>Pulvinaria tyleri</i> Ckll.	<i>Aspidiotus cydoniae</i> Comst.

<i>Caesalpinia pulcherrima</i> (Linn.) Sw.	<i>Cycas circinalis</i> Linn.
<i>Calanthe</i> sp.	<i>Chrysomphalus rossi</i> (Mask.).
: <i>hemisphaerica</i> (Targ.).	<i>Scissatia hemispherica</i> (Targ.).
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<i>Chrysanthemum indicum</i> Linn.	<i>Eriodendron anfractuosum</i> DC. (= <i>Ceiba pentandra</i> Gaertn.).
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<i>Citrus decumana</i> Murr.	<i>Eugenia calabocob</i> C. B. Rob.
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: <i>viridis</i> (Gre)	<i>Parlatoria protocis</i> (Cart.).
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<i>Pseudococcus filamentosus</i> (Ckll.).	<i>Hemiclionaspis townsendi</i> Ckll.
<i>Pseudococcus virgatus</i> (Ckll.).	<i>Graptophyllum hortense</i> Nees. [= <i>G. pictum</i> (Linn.) Griff.].
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<i>Pseudoaonidia curculiginis</i> (Green).	<i>Aspidiotus cydoniae</i> Comst.
	<i>Homalomena philippinensis</i> Engl.
	<i>Pinnaspis buxi</i> (Bouché).
	<i>Ixora coccinea</i> Linn.
	<i>Lepidosaphes icoreae</i> Ckll. and Rob.

<i>Leucosyke capitellata</i> Wedd.	<i>Rosa</i> sp.
<i>Icerya jacobsoni</i> Green.	<i>Aulacaspis rosea</i> (Bouché).
<i>Litsea</i> sp.	<i>Sandericum koetjape</i> (Burn. f.) Merr.
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<i>Machilus</i> sp.	<i>Pinnaspis siphonodontis</i> Ckll. and Rob.
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<i>Aspidiotus destructor</i> Sign.	<i>Spondias</i> sp.
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<i>Mangifera verticillata</i> C. B. Rob.	<i>Strychnos nux-vomica</i> Linn.
<i>Aspidiotus destructor</i> Sign.	<i>Coccus viridis</i> (Green).
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<i>Phenacaspis thoracica</i> Rob.	<i>Pseudococcus tayabanus</i> Ckll.
<i>Musa sapientum</i> Linn.	<i>Uvaria</i> sp.
<i>Aspidiotus translucens</i> Ckll.	<i>Hemiclionaspis uvariae</i> Ckll. and Rob.
<i>Phoenix dactylifera</i> Linn.	<i>Vitis vinifera</i> Linn.
<i>Aspidiotus translucens</i> Ckll.	<i>Chrysomphalus pedunculiformis</i> Ckll. and Rob.
<i>Piper</i> sp.	<i>Voacanga globosa</i> (Blanco) Merr.
<i>Hemiclionaspis aspidistrae</i> Sign.	<i>Protopulvinaria longivalvata</i> bakeri Ckll.
<i>Piper loheri</i> C. DC.	<i>Withania organifolia</i> Paill. and Bois.
<i>Platylecanium oribrigerum</i> Ckll. and Rob.	<i>Saissetia nigra</i> (Nietn.).
<i>Plectronia viridis</i> Merr.	<i>Xanthosoma sagittifolium</i> Schott.
<i>Paralecanium luzonicum</i> Ckll.	<i>Pseudococcus virgatus</i> (Ckll.).
<i>Psidium araceum</i> Raddi.	
<i>Aspidiotus translucens</i> Ckll.	
<i>Psidium guajava</i> Linn.	
<i>Icerya seychellarum</i> (Westw.).	
<i>Pulvinaria psidii</i> Mask.	

EXPLANATION OF TERMS APPLIED TO COCCIDÆ

ANAL CLEFT. Incision extending from caudal margin to anal orifice.

ANAL ORIFICE Caudal opening of the alimentary canal (Plate IV, fig. 6;
 " " V, fig. 2).

ANAL PLATE Chitinous process around or near anal orifice (Plate II,
fig. 15).

ANAL RING Chitinous ring inclosing anal orifice (Plate II, fig. 15).

CARINA (æ) Ridges on male or female scale (Plate VI, figs. 9 and 11).

CARINATE. Having carinae.

CAUDAL AREA Region near the posterior margin, also called the pygidium.

CERIFEROUS GLANDS. Glands of the caudal area, the pores of which open
in chitinous rings (Plate I, fig. 2).

CIRCUMGENITAL GLAND. A gland that furnishes the secretion for covering the eggs. It discharges by a group of circular openings around the genital aperture (Plate VI, fig. 4).

DIGITULES. Projections on tarsus or claw, appearing as knobbed or broadly dilated hairs.

DORSAL PORES. Oval orifices on dorsal surface, often in rows through which substance secreted for scale is discharged (Plate IV, fig. 4).

EXUVIA (AB). Integumenta of larva and pupa, which are molted and incorporated in the scale (Plate V, figs. 4, 9, and 12).

KEELED. Carinate.

LORES. Divisions of the caudal area occurring in pairs, often described as being bilobed, bidentate, bicuspid; terminal pair known as median, others number laterally from median (Plate IV, fig. 11).

LOBULES. Divided lobes (Plate VI, figs. 5, 10, and 13).

PLATES. Projections arising without a base, in a circle; described as bidentate, notched, fringed (Plate V, figs. 3 and 11).

SCALE Shieldlike covering of insect, composed of adult secretion and exuviae (Plate V, figs. 4, 9, and 12).

SPINE. Projection arising from a base within a circle (Plate III, fig. 3).

SPINELIKE PLATE. Plate similar to a spine, arising as a plate (Plate III figs. 1 and 18).

SQUAMEL. Name often applied to a spinelike plate.

STIGMATIC AREA. Region of breathing pore; stigmatic spines often found here (Plate II, figs. 5, 7, and 13).

TUBULAR SPINNERETS. A series of cylindrical or infundibuliform glands, opening by dorsal pores.

ILLUSTRATIONS

PLATE I

Figs. 1 to 3. *Icerya jacobseni* Green, 1, antenna of female, $\times 53$; 2, ceriferous glands of female; 3, adult female, dorsal view (From Green.)

FIG. 4. *Icerya candida* Cockerell, antenna of female, $\times 75$.

5. *Icerya seychellarum* (Westwood), antenna of female, $\times 75$.

Figs. 6 and 7. *Pseudococcus virgatus* (Cockerell), 6, antenna of female, $\times 75$; 7, hind leg of female, $\times 38$.

8 and 9. *Pseudococcus filamentosus* (Cockerell), 8, antenna of female, $\times 135$; 9, fore leg of female, $\times 75$.

FIG. 10. *Coccus elongatus* (Signoret), antenna of female, $\times 150$.

11. *Coccus diversipes* Cockerell, antenna of female, $\times 150$.

12. *Coccus viridis* (Green), antenna of female, $\times 150$.

PLATE II

Figs. 1 to 3. *Protopulvinaria longivalvata bakeri* Cockerell, 1, scale of female; 2, scale of male; 3, antenna of female. (From Cockerell.)

4 and 5. *Pulvinaria pridae* Maskell, 4, antenna of female, $\times 195$; 5, stigmatic area of female.

6 and 7. *Pulvinaria thespiae* Green, 6, antenna of female, $\times 98$; 7, stigmatic area of female.

8 and 9. *Ceroplastes gigas* Cockerell, 8, caudal margin of female; 9, cephalic margin of female. (From Cockerell.)

FIG. 10. *Paralecanium lusonicum* Cockerell, antenna of female, $\times 195$.

Figs. 11 to 13. *Paralecanium coecophylle* Banks, 11, antenna of female (from Banks); 12, antenna of female, $\times 195$; 13, marginal plates and stigmatic area of female (from Banks).

14 to 17. *Platylecanium cribrigerum* Cockerell and Robinson, 14, compound cribriform plates of female; 15, anal plates and ring of female; 16, antenna of female; 17, dermal processes of female.

FIG. 18. *Saissetia hemisphaerica* (Targioni Tozzetti), dermal pores of female.

19. *Saissetia nigra* (Nietner), dermal pores of female.

PLATE III

Figs. 1 and 2. *Oedenaspis schizostachyi* Cockerell and Robinson, 1, caudal margin of female; 2, scales on adult female.

3 and 4. *Fiorinia fioriniae* (Targioni Tozzetti), 3, caudal margin of female (from Cooley); 4, scale of female (after Newstead).

- Figs. 5 to 7. *Fiorinia phantasma* Cockerell and Robinson, 5, caudal margin of female; 6, caudal margin of second stage female; 7, adult female at period of gestation.
- 8 to 10. *Aulacaspis rosea* (Bouché), 8, caudal margin of female; 9, female scale (after Newstead); 10, scale of second stage female (after Newstead).
- 11 and 12. *Phenacaepis inday* (Banks), 11, caudal margin of female; 12, female scale. (After Banks.)
- 13 and 14. *Phenacaspis mischocarpi* Cockerell and Robinson, 13, caudal margin of female; 14, female scale.
- FIG. 15. *Phenacaspis pellucida* sp. nov., caudal margin of female.
- Figs. 16 and 17. *Phenacaspis thoracica* sp. nov., 16, adult female; 17, caudal margin of female.
- FIG. 18. *Phenacaspis pallida* sp. nov., caudal margin of female.

PLATE IV

- Figs. 1 and 2. *Chrysomphalus aurantii* (Maskell), 1, caudal margin of female; 2, adult female.
- FIG. 3. *Chrysomphalus pedroniformis* Cockerell and Robinson, caudal margin of female.
4. *Chrysomphalus aonidum* (Linnaeus), caudal margin of female.
5. *Chrysomphalus rossi* (Maskell), caudal margin of female.
- Figs. 6 and 7. *Schizaspis lobata* Cockerell and Robinson, 6, caudal margin of female; 7, adult female.
- FIG. 8. *Parlatoria zistiphus* (Lucas), caudal margin of female.
9. *Parlatoria proteus* (Curtis), caudal margin of female (from Palmer).
10. *Parlatoria greeni* Banks, caudal margin of female (from Banks).
11. *Parlatoria pergandei* Comstock, caudal margin of female.
- Figs. 12 and 13. *Selenaspidus articulatus* (Morgan), 12, caudal margin of female; 13, adult female. (From Newstead.)

PLATE V

- FIG. 1. *Aspidiotus cydoniae* Comstock, caudal margin of female (after Comstock).
2. *Aspidiotus coryphae* Cockerell and Robinson, caudal margin of female.
- Figs. 3 and 4. *Aspidiotus destructor* Signoret, 3, caudal margin of female; 4, female scale (from Banks).
- FIG. 5. *Aspidiotus translucens* Cockerell, caudal margin of female (after Green).
6. *Aspidiotus tayabanus* Cockerell, caudal margin of female (from Cockerell).
7. *Aspidiotus rapax* Comstock, caudal margin of female (after Comstock).
8. *Pseudoaonidia obsita* Cockerell and Robinson, caudal margin of female.
- Figs. 9 and 10. *Pseudoaonidia trilobitiformis* (Green), 9, female scale; 10, caudal margin of female. (After Green.)

- FIG. 11. *Pseudoaonidia circuliginis* (Green), caudal margin of female.
- FIGS. 12 and 13. *Lepidosaphes rubrovittatus* Cockerell, 12, female scale; 13, caudal margin of female. (From Cockerell.)
- FIG. 14. *Lepidosaphes lasianthi* (Green), caudal margin of female.

PLATE VI

- FIG. 1. *Lepidosaphes luzonica* sp. nov., caudal margin of female.
2. *Lepidosaphes iwori* Cockerell and Robinson, caudal margin of female.
3. *Lepidosaphes coeculi* (Green) caudal margin of female.
4. *Lepidosaphes mcgregori* Banks, caudal margin of female (after Banks).
5. *Lepidosaphes unicolor* Banks, caudal margin of female (after Banks).
6. *Hemichionaspis uvariae* Cockerell and Robinson, caudal margin of female.
7. *Hemichionaspis townsendi* Cockerell, caudal margin of female.
- FIGS. 8 to 10. *Hemichionaspis aspidistræ* (Signoret), 8, female scale; 9, male scale; 10, caudal margin of female.
- FIGS. 11 to 13. *Pinnaspis siphonodontis* Cockerell and Robinson, 11, white male scale; 12, brown male scale; 13, caudal margin of female.
- FIG. 14. *Pinnaspis buxi* (Bouché), caudal margin of female (after Comstock).

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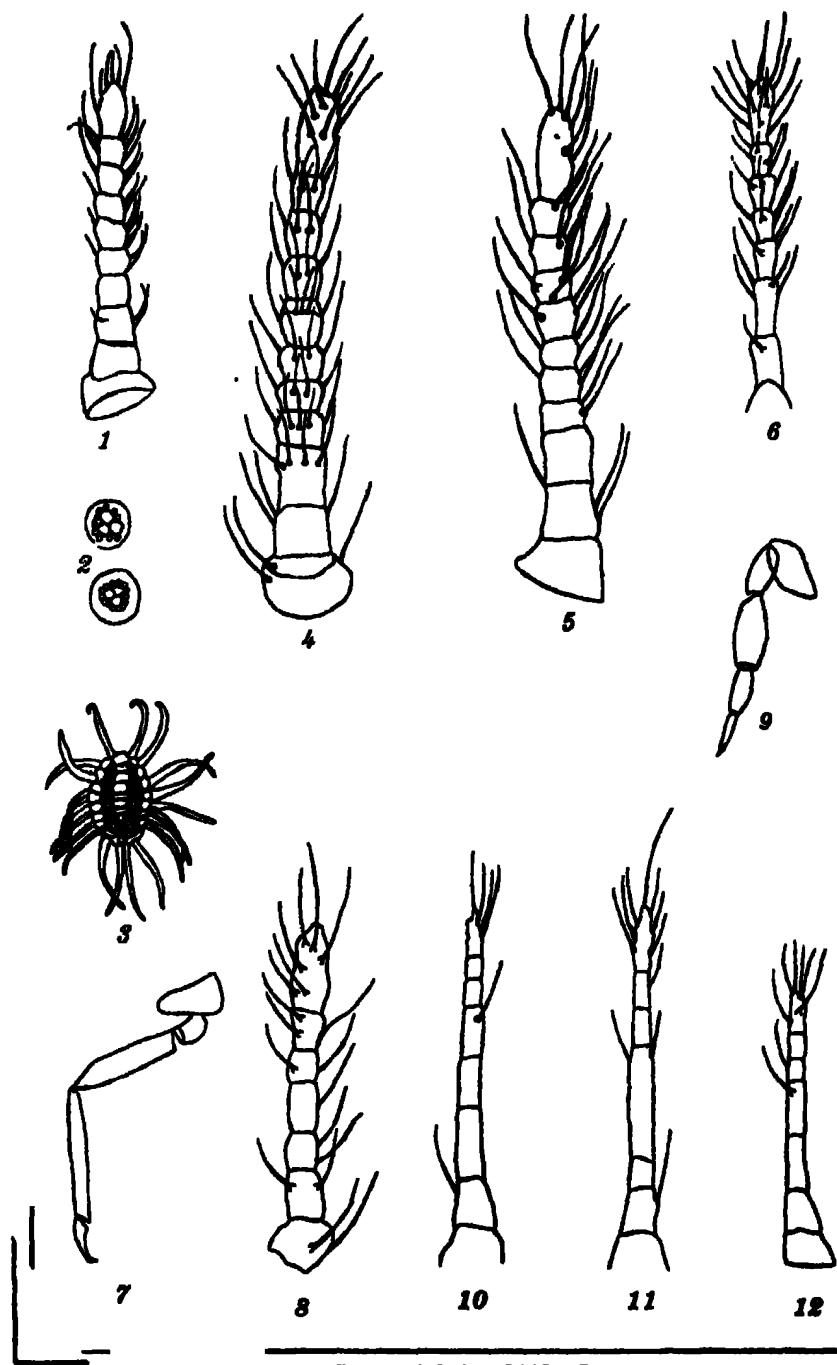


PLATE I. PHILIPPINE COCCIDAE.

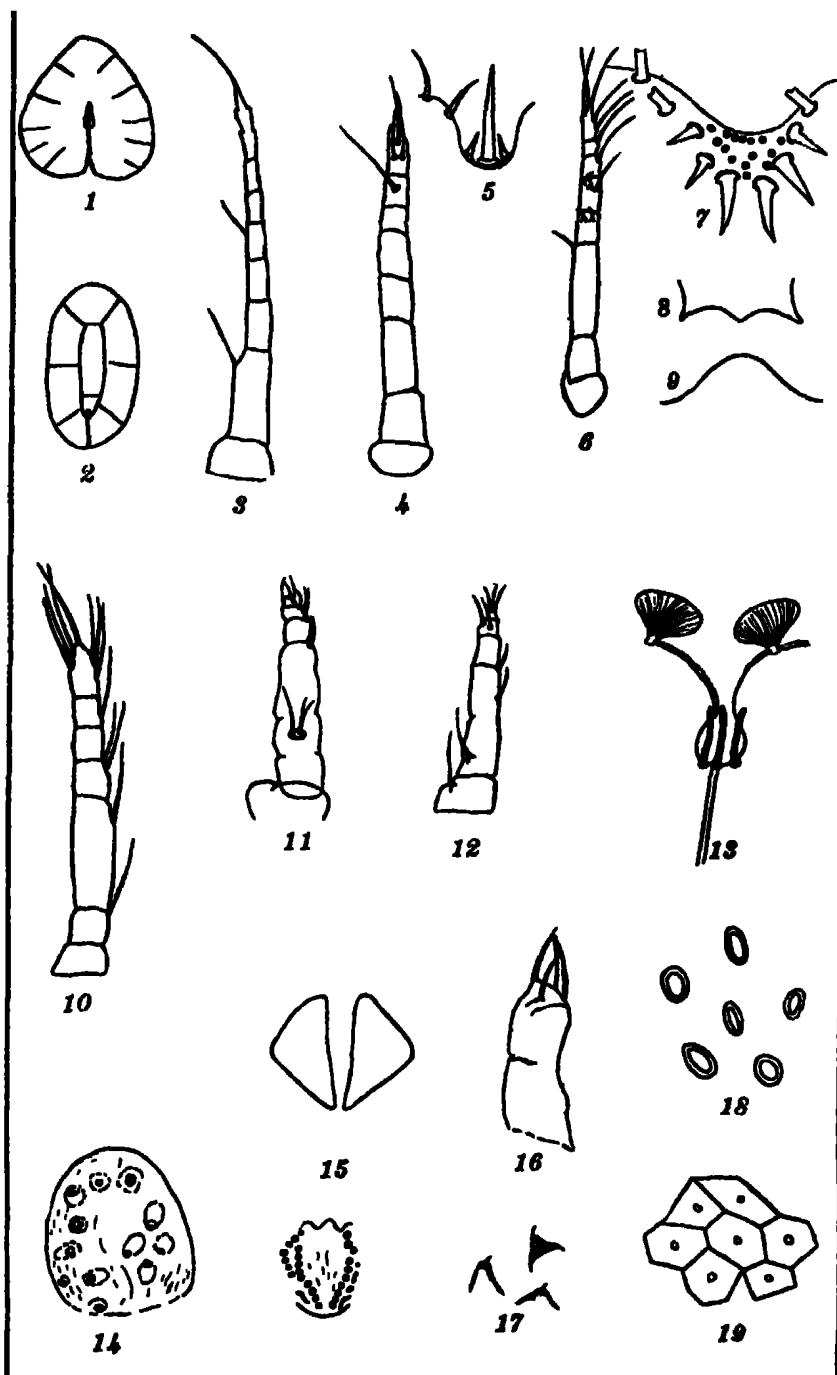
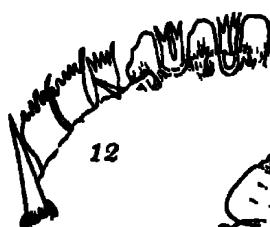
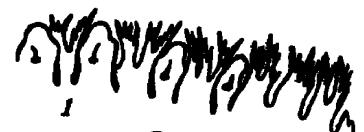


PLATE II. PHILIPPINE COCCIDEA.





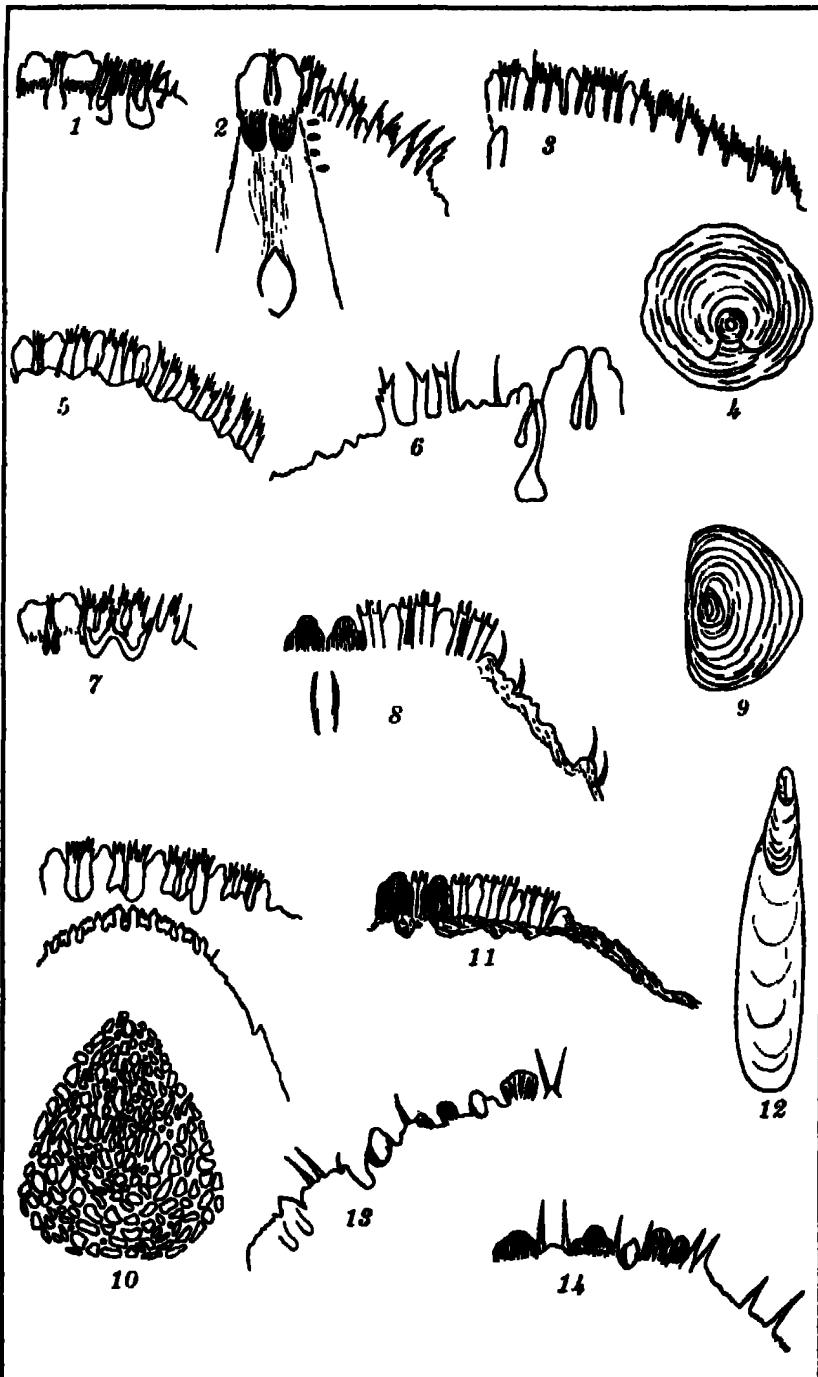
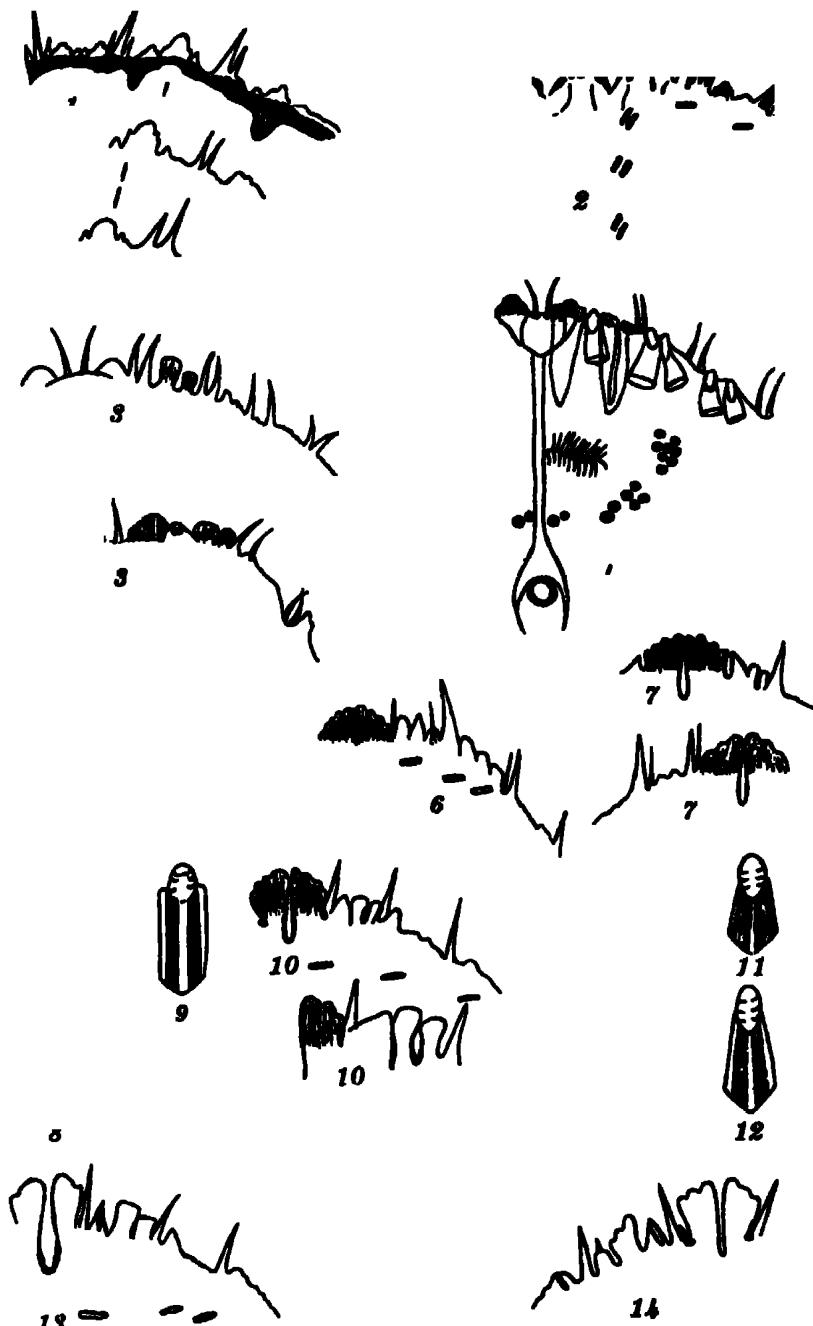


PLATE V. PHILIPPINE COCCIDÆ.



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THE DERBIDÆ OF THE PHILIPPINE ISLANDS

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ONE PLATE AND FOUR TEXT FIGURES

The Philippine Archipelago bids fair to be one of the richest regions in the world in the delicate little insects included in the family Derbidæ. For many years the four species recorded by Stål¹ were all that were known from the Archipelago; Banks has added a few species, and Melichar, working upon a part of Professor Baker's collection, has added others. The present paper brings the total to 98 species in 39 genera. There are about a dozen species of the Rhotaninæ that I have not yet been able to identify satisfactorily, so that the total number of species now known is well over one hundred.

The material I had at my disposal was the large collection made by Prof. C. F. Baker, collections belonging to the Philippine Bureau of Science and the College of Agriculture, and collections made by myself during my three visits to Luzon. The greater portion of the Baker collection and all of my own were made on Mount Maquiling and in the neighboring district of Los Baños, situated in Laguna Province, Luzon; apart from these, a few specimens from Baguio, Mount Banahao, and a few other localities are all we have of the Derbidae of Luzon. The large island of Mindanao is represented by small collections from Davao, Zamboanga, and one or two other localities; there are a few

¹ *Öfv. Vet. Akad. Förh.* (1870), 27, 750.

specimens from the adjacent island of Basilan. A few specimens from Palawan and from Negros complete the material known from the Archipelago. It is evident, therefore, that our collections are far too incomplete to judge with any certainty of the endemism in the various islands. Of the 98 species listed, 68 are recorded from Luzon and 36 from Mindanao, only 12 being common to the two islands. I believe that further collecting will show a very high percentage of species peculiar to the different islands. Many of the species have been erected upon characters found in the male genitalia—the form of the pygophor, anal segment, and genital styles being the characters used—but the final word on endemism will not be spoken until a careful comparison has been made of the *sexeagi* of the species represented in two or more islands. The case of *Kamendaka mindanensis* and its three allies is a good illustration of the truth of this contention. Objections have been raised to "phallic" species, but if distinct structural differences are found in these organs, I fail to see why they should not be considered specific. If an equal difference in structure were to be found in the head, the thorax, or the abdomen, there would be no objection to treating them as specific; in fact in some cases they would be used for erecting genera. Unfortunately the majority of fulgoroids have been described without any reference to their sex.

Of the 98 Philippine derbids, only 13 are reported from foreign countries, and these are mainly from Borneo and Java. This confirms a remark I made elsewhere that there is a high endemism among these insects in the islands of the Malay Archipelago. The derbid fauna of British India, including Ceylon and Burmah, numbers 53 species, that of Java numbers less than 30, and more collecting has been done in those regions than in the Philippine Islands.

But little is known of the life history of these small creatures; the eggs have never been described, and I have failed to find them. The few nymphs that have been described all live in rotten wood or under old bark. *Proutista maesta* (Westwood) is a common insect on sugar cane in Java, the Philippine Islands, Formosa, and some other countries of the Pacific, but nothing is known of its eggs or young.

Fifty-five of the 68 species of derbids found in Luzon have been taken on Mount Maquiling and in the neighboring locality of Los Baños. This is a remarkable botanical and entomological region and deserves a passing reference. Sixty-five kilometers from the city of Manila, the mountain rises from the

southern shore of Laguna de Bay. This lake is the largest body of fresh water in the Archipelago and nearly cuts Luzon into two portions, its western shore being about 15 kilometers from Manila Bay and its eastern shore less than 30 kilometers from the eastern coast. The mountain rises to the height of 1,143 meters, and its base covers an area of some 10,000 hectares; it is of volcanic origin, but the only signs of volcanic activity at present are a small, boiling-mud crater, on the northeast flank of the mountain, and a series of hot mineral springs, along the northern base, some of which arise at the edge of Laguna de Bay and give the name to the town of Los Baños.

The mountains along the eastern coast hold back the moisture of the winter monsoons, so that the western portion of the island experiences considerable dryness from January to May; Mount Maquiling is on the eastern edge of this dry district, but its peak is high enough to support a wet forest. Mount Banahao (some 2,300 meters high) is only 50 kilometers from the former mountain and is well within the wet, eastern district. The difference in the growth of vegetation in these two districts is very great.

The flora of Mount Maquiling has been investigated by Dr. F. W. Foxworthy, of the Bureau of Forestry; by Dr. E. B. Copeland, of the College of Agriculture; and by Dr. W. H. Brown, of the Bureau of Science. There have been recorded from the mountain 1,814 species of ferns and of flowering plants, representing 164 families; 800 of these species are trees. Not only are the plant species on the mountain remarkably numerous, but the mixed nature of the vegetation in any one station is also notable.

As might have been expected, the rich and varied flora of the mountain supports a rich insect fauna. Of the many species that Professor Baker and his collector, Julian Valdez, have already secured, only a small part has been identified or described.

Few finer localities than Mount Maquiling could be found for the establishment of a biological station; situated on the edge of a large lake, with higher mountains in a different climatic province within easy reach, this natural botanic garden should be to the northwestern portion of the triangular area comprising the Malay Archipelago what Buitenzorg is to the southwestern portion. The College of Agriculture and the School of Forestry are situated at the northeastern foot of the mountain and form a center around which a biological station could be formed. Although the facilities one finds at Buitenzorg are

lacking at Los Baños, yet the same spirit of hospitality and the desire to assist visiting naturalists are present, and it is to be hoped that at a not too far distant date means will be found to enable workers to take full advantage of this wonderful botanical and entomological field.

As an economic entomologist who has spent a number of years traveling in the Malay and South Pacific Islands in search of beneficial insects, I can fully appreciate the practical value of an entomological station in such a locality. Why should the moth sugar-cane borer (*Diatraea striatalis* Sn.) be so numerous and destructive in Java and Formosa and rare in the Philippine Islands? Why should one species of leaf-hopper (*Perkinsiella*) nearly ruin the sugar industry in the Hawilian Islands and seven species do only minor damage in the Philippine Islands? What keeps in check the thousands of phytophagous insects of great fecundity and rapid development that inhabit these tropical islands? These and similar problems when solved will be the saving of valuable crops all over the Tropics, and the knowledge of these subjects will enable us to reason on biological subjects, such as natural selection and evolution, with a better understanding. In the past experimental zoölogy has been undertaken almost entirely in temperate climates, but in the future a great portion of this will be done in the Tropics on account of the greater facilities. Biologists working on the laws of inheritance often have to wait a year for one generation in the Temperate Zones; whereas, in the Tropics, it would be possible to have ten or a dozen in the same period. For these and for other reasons I would plead for biological stations in such localities as Mount Maquiling—even if, by so doing, I stray away from the subject of this paper.

In a former paper² I attempted to tabulate all of the genera of Derbidae. Since then many forms have passed through my hands, and the tables have stood the test fairly well. Except in certain details I am not inclined to make many alterations in that work. What I formerly called groups I now treat as subfamilies. *Nisia* and its allies I excluded from the family; *Derbe* and *Mysidia* I at present place with the *Zoraida* group; *Rhotana*, along with five or six allied genera, remain in old group IV (Rhotaninæ).

The horismology of the neuration is indicated in the figures; the "shoulder keels" are well-developed carinæ extending from the anterior margin of the pronotum near back of eye to the

posterior margin of pronotum; in some cases these are continued along the hind edge to the lateral margins, which are curved and form a chamber—the "antennal chamber"—behind the antennae; the "subantennal process" is a flange, or plate, on the gena below the antenna.

All measurements are taken from apex of head to anus and from apex to base of one tegmen.

My thanks are due to Prof. C. F. Baker for the loan of his collection and for the gift of many specimens, including types; to Prof. C. S. Banks for allowing me to work over the collection of the Bureau of Science and for gifts of specimens; and to the dean and the faculty of the College of Agriculture, University of the Philippines, for their help and hospitality during my stay in the Philippine Islands, while studying the parasites of certain lamellicorn beetles.

Types, when not otherwise stated, will be deposited in the collection of the Hawaiian Sugar Planters' Association, Honolulu, Hawaii, which already contains nearly a third of the types of this family.

The following genera and species are considered in this paper:

PHILIPPINE DERBIDÆ

<i>Goneokara pullum</i> Muir.	<i>Nesokaha lineata</i> Muir.
<i>Neocyclokara flava</i> g. et sp. nov.	<i>Nesokaha philippina</i> Muir.
<i>Phaciocephala badia</i> sp. nov.	<i>Nesokaha rubrinervis</i> sp. nov.
<i>Phaciocephala pseudobadiu</i> sp. nov.	<i>Nesokuha nigropunctata</i> sp. nov.
<i>Syntames tubulifer</i> Melichar.	<i>Kaha flava</i> sp. nov.
<i>Herpis flavescens</i> sp. nov.	<i>Kahu pseudomedia</i> s
<i>Herpis philippina</i> "	" <i>angulata</i> sp. nov.
<i>Herpis pallidinervis</i> sp. nov.	<i>isaccharissa philippina</i> sp.
<i>Vekunta lineata</i> Melichar.	<i>isacchariana pulchra</i> sp. nov.
<i>Vekunta palawanensis</i> sp. nov.	<i>isaccharissa fusca</i> sp. nov.
<i>Lamenia albicosta</i> sp. nov.	<i>imendaka mindanensis</i> sp.
<i>Lamenia bakeri</i> sp. nov.	<i>imendaka luzonensis</i> sp. nov.
<i>Lamenia philippina</i> sp. nov.	<i>imendaka tayabasensis</i> sp.
<i>Lamenia flavescens</i> Melichar.	<i>ika maquilingensis</i> s
<i>Lamenia pseudotypicus</i> (Mui s (Muir).	<i>rendaka flava</i>
<i>Lamenia pallidin</i>	mmoda s
<i>Neolamenia flava</i> g. et sp. nov.	<i>Nicerta palawanensis</i> sp. nov.
<i>Pyrhoneura maculata</i> sp. nov.	<i>Megatropis obliquefasciata</i> Melichar.
<i>Phantasmatocera fuscofasciata</i> sp. nov.	<i>Megatropis immaculata</i> Muir.
<i>Dendrokara monstrosa</i> Melichar.	<i>Megatropis sanguinea</i> sp. nov.
<i>Dendrokara torva</i> Melichar.	<i>Megatropis interruptolineata</i> Me- lichar.
<i>Neodendrokara crescentiformis</i> g. et sp. nov.	<i>Banksiella pulchra</i> g. et. sp. nov.
	<i>Leptaleocera nigrofasciata</i> sp. nov.

<i>Leptaleocera bakeri</i> Melichar.	<i>Mindana latifrons</i> g. et sp. nov.
<i>Leptaleocera bankoi</i> sp. nov.	<i>Proutista maesta</i> (Westwood).
<i>Heronar maculipennis</i> (Melichar)	<i>Proutista migratoria</i> sp. nov.
comb. nov.	<i>Neocamma trifasciata</i> Melichar.
<i>Mynidiooides tagalica</i> sp. nov.	<i>Parnproutista trifasciata</i> sp. nov.
<i>Zeugma valdezi</i> sp. nov.	<i>Paraproutista luzonensis</i> sp. nov.
<i>Zoraida insulicola</i> Kirkaldy.	<i>Paraproutista maculipennis</i> (Banks)
<i>Zoraida maculata</i> sp. nov.	comb. nov.
<i>Zoraida javanica</i> (Westwood).	<i>Paraproutista platypes</i> sp. nov.
<i>Zoraida westwoodii</i> (Stål).	<i>Paraproutista fuscipennis</i> sp. nov.
<i>Zoraida lutescens</i> sp. nov.	<i>Acanthocera punctifrons</i> Melichar.
<i>Zoraida hyalina</i> Melichar.	<i>Sikaiana mukii</i> Muir.
<i>Zoraida flaviventris</i> sp. nov.	<i>Sikaiana vitriceps</i> sp. ?
<i>Zoraida sinuosa</i> (Boh.)	<i>Muiria irides</i>
<i>Zoraida melichari</i> sp. nov.	<i>Leomelicharia nigrovittata</i> sp. nov.
<i>Losbañosia bakeri</i> g. et sp. n.	<i>Leomelicharia delicata</i> sp. nov.
<i>Peggia nitida</i> (Stål) comb. nov.	<i>Leomelicharia delicatissima</i> sp. nov.
<i>Peggia irrorata</i> sp. nov.	<i>Leomelicharia pulchra</i> sp. nov.
<i>Peggiopsis dorsimaculata</i> sp.	<i>Distantinia nigrocacuminis</i> g. et sp.
<i>Peggiopsis pallida</i> sp. nov.	
<i>Peggiopsis pseudojavana</i> sp. nov.	<i>Rhotana punctovenosa</i> Melichar.
<i>Peggiopsis puncticosta</i> (Melichar)	<i>Rhotana excelsa</i> Melichar.
comb. nov.	<i>Rhotana basipunctulata</i> Melichar.
<i>Peggiopsis dorsopunctata</i> (Melichar)	<i>Levu lucida</i> Muir.
comb. nov.	<i>Levu irrorata</i> sp. nov.
<i>Peggiopsis pseudopuncticosta</i> sp. nov.	<i>Decora pavo</i> Bierman.
<i>Peggiopsis flavigornis</i> (Melichar)	<i>Mecynorhynchus fuscus</i> Muir.
comb. nov.	<i>Mecynorhynchus hyalinus</i> Muir.
<i>Peggiopsis pseudoflavicornis</i> s.	<i>Mecynorhynchus kershawi</i> Muir.
<i>Peggiopsis stdli</i> sp. nov.	

The following characters will separate the subfamilies, the tribes, and the genera of the present known Philippine forms:

Key to the subfamilies of Philippine Derbidae.

- a¹. Tegmina exceptionally long and narrow, wings less than half the length of tegmina, sometimes very minute; or, if wings longer, cubitus with 3 to 11 veins reaching hind margin..... *Derbiinae*.
- a². Tegmina not long and narrow, wings more than half the length of tegmina.

 - b¹. Cubital veins not reaching to hind margin, but ending in the extended claval vein; third claval cell open, extending along hind margin to last apical cell. *Otioocerinae*.
 - b². Cubital veins ending in hind margin of tegmen; third claval cell closed, not extending to last apical cell.

 - c¹. Cubitus simple or furcate, not running into first median sector. *Cenchrinae*.
 - c². Cubitus connected with first median sector, forming an angular or diamond-shaped cell, sometimes with a cross vein near base of first sector, forming a triangular cell. *Rhotaninae*.

Key to the genera of Philippine Cenchrinae.

- a'. Subcosta and radius separate from near base, subcostal cell long.
 b'. No subantennal process, or, if present, very small.
 c'. Shoulder keels large, forming a distinct antennal chamber. *Phaciocephalus.*
 c'. Shoulder keels absent or very small, forming no distinct antennal chamber *Goneokara.*
 b'. Subantennal process well developed.
 d'. Subcosta and radius separate from near base; tegmen with apex broad, roundly truncate. *Herpis.*
 d'. Subcosta and radius separate slightly before middle; tegmen long, apex pointed *Neocyclovara.*
 a'. Subcosta and radius contiguous to middle or beyond; subcostal cell short.
 e'. Subantennal process absent or but slightly developed *Vekunta.*
 e'. Subantennal process present.
 f'. Antennae reaching to apex of head, large and flattened *Neolamenia.*
 f'. Antennae small, subovate or subpyriform *Lamenia.*

Key to the genera of Philippine Otiocerinae.

- a'. Media not contiguous to radius or separating before the forking of subcosta and radius.
 b'. First median sector arising before the apical third of tegmen.
 c'. Forking of subcosta and radius occurring at or before the middle of tegmen; subcostal cell long.
 d'. Antennae with first joint long, much longer than wide.
 e'. No subantennal process *Dendrokara.*
 e'. Subantennal process present *Neodendrokara.*
 d'. First joint of antennae short; not or but little longer than wide
 f'. No subantennal process.
 g'. In profile vertex and face forming a curve, not produced greatly in front of eyes *Pyrhoneura.*
 g'. In profile head angular or extending well in front of eyes
 h'. Carinae of vertex meeting at apex, in profile angular at junction of face and vertex. ♂ *Phantasmatocera*
 h'. Carinae of vertex not meeting, in profile face and vertex forming a continuous curve ♀ *Phantasmatocera*
 f'. Subantennal process present.
 i'. In profile head with vertex forming a curve, face not greatly produced *Nesokaha.*
 i'. In profile head with vertex quadrate or angular, greatly produced *Kaha.*
 e'. Forking of subcosta and radius beyond middle of tegmen; subcostal cell short.
 j'. In profile vertex and face obtusely angular; face strongly curved, especially on apical half *Eosaccharissa.*
 j'. In profile vertex and face acutely angular; face only slightly curved *Kamendaka.*
 b'. Median sectors confined to apical third of tegmen.
 k'. Costal edge of tegmen not entire *Banksiella.*
 k'. Costal edge of tegmen entire.
 l'. Eyes in front reaching nearly to base of clypeus.

- m¹. Eyes reaching margin of clypeus, reniform, anterior half equal in size to posterior half *Nicerta*.
- m². Eye reaching not quite to base of clypeus, subreniform, anterior half much narrower than posterior half *Leptaleoocera*.
- r. Eye in front not reaching nearly to base of clypeus *Megatropis*.
- a¹. Media not separating from radius until after forking of subcosta and radius.
- n¹. Subantennal process absent *Heronax*.
- n². Subantennal process present *Myridioides*.

Key to the genera of Philippine Derbinæ.

- a¹. Eyes in front not reaching to base of clypeus, subcostal cell long, sometimes very narrow (*Derbini*).
- b¹. Shoulder keels large, subantennal process present *Zeugma*.
- b². Shoulder keels not large, subantennal process absent.
- c¹. Antennæ terete, subterete, ovate, or subovate.
 - d¹. Four cubital veins reaching hind margin, first median sector included in cubital system; antennæ large, longer than face (female with genital styles normally developed).
 - e¹. Hind edge of tegmen entire *Zoraida*.
 - e². Hind edge of tegmen serrate *Lesbiaflosia*.
 - d². Antennæ short, not longer than face (female with genital styles abortive).
 - f¹. Clavus closed, claval suture and vein entering hind margin (according to Melichar's figures).
 - g¹. Subcosta and radius separating near base, amalgamating at apex; clypeus large, carinae distinct *Weccamma*.
 - g². Subcosta and radius not amalgamated at apex; clypeus smaller, carinae indistinct *Acanthocera*.
 - f². Clavus open, first claval vein extended to cubital system.
 - h¹. Media with 4 or 5 unbranched sectors *Proutista*.
 - h². Media with 4 or 5 sectors, the second furcate (first true sector attached to cubital system) *Paraprontista*.
 - c². Antennæ flattened (female with genital styles normally developed).
 - i¹. Basal fourth of costa arcuate *Peggia*.*
 - i². Basal fourth of costa not arcuate.
 - j¹. Face very narrow, vertex not broader than long *Peggiopsis*.
 - j². Face nearly as broad as long, vertex broader than long *Mindana*.
 - a². Subcostal cell very short or absent; eyes in front reaching to base of clypeus (female with genital styles abortive) (*Sikeianini*).
 - k¹. Cubitus arising from base of tegmen, basal median cell present.
 - l¹. Basal median cell broad and short, not reaching halfway along tegmen.
 - m¹. Antennæ much shorter than thorax and head together, cylindrical, slightly constricted about middle *Sikaiana*.
 - m². Antennæ as long as head and thorax together or nearly so.
 - n¹. Basal median cell very narrow, reaching to about middle of tegmen.
 - o¹. Cubitus arising from media about one fourth from base *Distantia*.

* As I am in doubt as to this genus, I leave it distinct from *Peggiopsis* for the present.

Key to the genera of Philippine Rhotanines.

- a'. Lateral carinae of face not contiguous, or only so for a very short distance between eyes; face not linear..... *Decora*.
- a'. Lateral carinae of face contiguous to near apex.
- b'. Triangular cell at base of first median sector.
- c'. Shoulder keels well developed *Levu*.
- c'. Shoulder keels absent or very slightly developed..... *Rhotana*.
- b'. No triangular cell at the base of first median sector. *Mecynorhynchus*.

DERBIDÆ**CENCHREINÆ****Genus GONEOKARA Muir**

Goneokara pullum Muir.

Goneokara pullum MUIR, Bull. Hawaiian Sugar Plant. Assoc., Div. Ent. (1913), 12, 33.

MINDANAO, Dapitan (*Baker*), one male. The type of this species is from Borneo.

Genus NEOCYCLOKARA novum

Neuration of tegmina similar to that of *Cyclokara girdlestonei* Muir; two cubital veins, four median sectors, the first furcate; wings reaching one fourth from apex of tegmina. Vertex subquadrate, base wider than apex, in profile making a continuous curve with face; much longer than broad, apex broader than base, narrowest between eyes, sides carinate, slightly arcuate; clypeus large, a little longer than face, flat on sides and front, lateral carinae distinct, median indistinct, apex reaching hind coxae, apex of labium reaching apex of abdomen; subantennal plate forming a quadrate plate below antenna, longer than broad; antennæ very small, ovate. Pronotum widely and shallowly emarginate on hind margin, shoulder keels well developed, lateral margins turned dorsad and forming, with subantennal plate, an antennal chamber; mesonotum broader than long, posterior angle rounded, lateral angles behind middle.

Neocyclokara flava sp. nov. Plate I, figs. 9 and 17.

Male.—Yellow, slightly fuscous on abdominal tergites. Tegmina hyaline, opaquely white with waxy secretion, a light fuscous mark across clavus, another from hind margin at apex of clavus to media, and as a narrow, bent mark to costa, bases of median sectors fuscous, and with fuscous at apices of subcostal and radial cells; wings opaquely white with waxy secretion, veins white.

Ventral edge of pygophor straight, lateral edges obtuse-angularly produced along the side of the anal segment; anal segment very small, annular; genital styles long, apex rounded, dorsal edge straight, ventral edge produced into an obtuse angle in middle, two curved spines on the inner side about middle, one near the dorsal and the other near the ventral edge.

Length, 2 millimeters; tegmen, 4.

Female.—Similar to the male in size and color.

MINDANAO, Lanao, Kolambugan (*Banks*), cotype in College of Agriculture, No. 18101; LUZON, Benguet, Baguio (*Baker*). The type is a male from Baguio.

Genus PHACIOCEPHALA Kirkaldy

Phaciocephala badia sp. nov.

Male.—Clypeus, face, vertex, and dorsum of thorax and abdomen black or fuscous brown, the rest fuscous yellow; in some specimens face and clypeus also yellow; tibiae and tarsi fuscous. Tegmina hyaline, fuscous, veins much darker, darker color spreading into cell; wings fuscous, veins brown. The whole insect often covered with white, waxy secretion which gives it a blue-black appearance.

Ventral edge of pygophor angularly produced, lateral edges slightly arcuate; anal segment narrowly cordate, the broadest portion forming the apex, a narrow emargination extending nearly to anus, anus in middle; genital styles long, dorsal edge entire, slightly curved upward, basal half of ventral edge subparallel to dorsal edge, then produced into a quadrate process beyond which it tapers to the pointed apex.

Female.—Posterior edge of pregenital sternite roundly produced in middle.

Length, 4 millimeters; tegmen, 6.

LUZON, Los Baños (*Baker, Muir*); Mount Maquiling and Mount Banahao (*Baker*), cotype in College of Agriculture, No. 18117. This comes near to *P. funebris* Muir * from Larat.

Phaciocephala pseudobadia sp. nov.

Yellow or very light brown, a dark brown spot in antennal chamber; posterior border of pronotum, carinae of vertex, and anal segment dark fuscous or brown, dorsum of abdomen fuscous, apices of tibiae fuscous; tegmina hyaline, opaque with waxy secretion, veins brown, the color spreading into cells, especially on basal half; wings hyaline, opaque with waxy secretion, veins brown.

* *Bull. Hawaiian Sugar Plant. Assoc., Div. Ent.* (1918), 12, 85.

The genitalia differ from those of *P. badia* in having the medioventral process more acute; the anal segment wider, with the apical emargination slightly wider; the quadrate process on dorsal edge of genital style more rounded; and the apex shorter and blunter.

Length, 4 millimeters; tegmen, 6.

MINDANAO, Lanao, Kolambungan (*Banks*), cotype in College of Agriculture, No. 18102, on nipa palm, *Nipa fructicans* Wurmb.

This species, like *P. badia*, is often covered with a white waxy secretion.

Genus SYNTAMES Fowler

Syntames tubulifer Melichar.

Syntames tubulifer MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 269.

I consider that this species represents a new genus of Cixiidæ; the neuration is not that of *Syntames*, and the long apical joint of the labium excludes it from the Derbidae. The peculiar abdominal structures are somewhat allied to those of *Benna* and *Bennaria*.

Genus HERPIS Stål

Herpis flavescentia sp. nov.

Congeneric with *H. vulgaris* (Fitch); subcosta and radius separate from base, vertex broader than long.

Male.—Yellow or fuscous yellow, eyes dark brown, dorsum of abdomen darker. Tegmina yellow or fuscous yellow, veins slightly darker; wings fuscous with brown veins.

Pygophor short, ventral and lateral edges straight; anal segment considerably longer than wide, gradually narrowing to near middle, then subparallel-sided to apex, which is obtusely pointed, a small dorsal ridge near the middle of base, anal style at apex on ventral surface; genital styles large, subquadrate, narrowest at base, widest at apex, on apical edge two small, angular projections turned inward.

Female.—Pregenital sternite exceedingly short at sides, posterior edge angularly produced.

Length, 1.75 millimeters; tegmen, 3.75.

Luzon, Tayabas, Mount Banahao (*Baker, Muir*); Malinao (*Banks*); Laguna, Los Baños (*Banks*), College of Agriculture, No. 18119.

Herpis philippina sp. nov.

Male.—Face, clypeus, legs, and sides of pronotum yellow, rest fuscous brown. Tegmina dark fuscous, veins darker; wings

fuscous with dark veins. The insect sometimes entirely covered with a white, waxy secretion giving it a blue-black appearance.

Ventral edge of pygophor straight, lateral edges slightly and very obtusely angular; anal segment long, narrow, apex and base subequal in width, narrowing to middle, a small dorsal projection near base, anus at apex, below which the apical corners are produced into two small spines; genital styles large, broadly lanceolate, apex turned inward and produced into a long spine.

Female.—Pregenital sternite very short at sides, angularly produced to middle.

Length, 2.25 millimeters; tegmen, 4.

Luzon, Laguna, Los Baños (*Muir*); Tayabas, Lucena (*Banks*), cotype in College of Agriculture, No. 18118.

Herpis pallidinervis sp. nov.

Male.—Vertex a little broader than long, a fine carina divides it from face; carinæ of mesonotum straight, parallel. Neurulation of tegmina irregular, three small spurs from subcosta into costal cell and four from radius into radial cell forming three small, incomplete cells within the radial cell. Brown, carinæ of head and thorax lighter brown. Tegmina brown with pale veins; wings fuscous with dark veins.

Ventral edge of pygophor straight, lateral edges slightly arcuate; anal segment subquadrate, length about twice the width of base, apex truncate and narrower than base, anus at apex; genital styles subquadrate, base narrower than apex, apex subtruncate with a deep emargination, a deep keel extends from base to apex down the middle, a small rounded process arises from the inside of the dorsal edge near the middle.

Length, 2 millimeters; tegmen, 3.7.

Female.—Similar to the male. Pregenital sternite short, especially at sides, posterior edge obtuse-angularly produced from sides to middle; anal segment very small, apex rounded.

MINDANAO, Davao (*Baker*).

Genus VEKUNTA Distant

Vekunta lineata Melichar.

Vekunta lineata MELICHAR, Phil. Journ. Sci., Sec. D (1914), 8, 270

This species is known to me only from the original description.

Vekunta palawanensis sp. nov.

Female.—Light reddish yellow or brown, head and pronotum lighter than mesonotum, darker mark on pleura, dorsum of abdomen darker brown. Tegmina hyaline, opaque with waxy

secretion, yellowish, veins darker; wings fuscous with darker veins, opaque with waxy secretion.

Pregenital sternite short at sides, median third of posterior edge produced into lanceolate process reaching a third from apex of styles; anal segment short, broadly lanceolate, not reaching to apex of genital styles, anus in middle.

Length, 2.5 millimeters; tegmen, 4.

PALAWAN, Puerto Princesa (*Baker*).

Genus LAMENIA Stål

Lamenia albicosta sp. nov.

Female.—Vertex slightly longer than wide, subantennal process forming a semicircular plate. Dark fuscous brown or black; antennæ, subantennal plate, clypeus, rostrum, and a broad posterior margin on pronotum yellow; legs and abdominal sternites light brown, front femora and bands on front tibiae fuscous. Basal half of tegmina fuscous, apical half fuscous on veins extending into cells, a white band along costa widening at end of costal cell.

Pregenital sternite with median third of posterior edge slightly produced, apex of production truncate.

Length, 2.75 millimeters; tegmen, 5.

LUZON, Tayabas, Mount Banahao (*Baker*).

Lamenia bakeri sp. nov.

Male.—Dark shining brown or black, antennæ, legs, and base of abdomen lighter, first and second tibiae with fuscous bands. Tegmina dark, shining brown or black, a long yellowish spot on costa at end of costal cell with a dark spot in the middle of it.

Ventral edge of pygophor straight, lateral edges angularly produced; anal segment large, length about three times the width, anus in basal third, sides subparallel to about middle then gradually converging to the obtusely pointed apex, in lateral view ventral edge straight; genital style long, narrow, curved upward, sides straight on basal half then gradually narrowing to the acutely pointed apex; a small, sharp spine arises from the inner surface near the base.

Length, 3 millimeters; tegmen, 4.

Female.—Similar to the male in color and size. Posterior edge of the pregenital sternite slightly produced from sides to middle third, which is produced into a subconical process with an obtuse apex and a slightly constricted base and with its disk raised into a small round knob.

MINDANAO, Davao (*Baker*).

Lamenia philippina sp. nov.

Male.—Dark shining brown, lighter over legs and ventral surface. Tegmina dark shining brown with a small light dot at the apex of costal cell.

Ventral edge of pygophor straight, lateral edges slightly rounded; anal segment long and narrow, length nearly four times the width, anus about one third from base, sides subparallel on basal half, gradually converging to apex, which is curved ventrad; a deep, narrow cleft from apex halfway to anus; genital styles long and narrow, the apices acute and curved upward; a sharp spine arises from the inner surface near base.

Length, 2.7 millimeters; tegmen, 4.

Female unknown.

MINDANAO, Davao (*Baker*).

Lamenia flavescens Melichar.

Lamenia flavescens MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 179.

Placed by its author with *Nisia*, in the Achilinæ. Specimens from the type locality that I identify as this species have the following genital characters:

Male.—Ventral edge of pygophor straight, lateral edges angularly produced; length of anal segment a little more than twice the width, anus in middle, sides parallel to middle, then gradually converging to the bluntly pointed apex; genital style long and narrow, slightly constricted just before the subtruncate apex; otherwise the edges subparallel, a quadrate process wider than high arises from the inner surface near base.

Female.—The posterior edge of the pregenital sternite slightly produced on lateral third, but steeply so on the median third, the production longer than broad at base, with rounded apex; sternite, including the production, longer than broad.

MINDANAO, Davao (*Baker*), one male, which agrees with the Maquiling specimens; Laguna, Los Baños (*Banks*), College of Agriculture, No. 18116.

Lamenia pseudotypicus (Muir).

Thyrocephalus pseudotypicus MUIR, Bull. Hawaiian Sugar Plant. Assoc., Div. Ent. (1913), 12, 40.

Two specimens from Mindanao—one from Davao and the other from Zamboanga (*Baker*)—appear to be this species, previously known from Borneo.

MINDANAO, Zamboanga and Davao (*Baker*).

Lamenia croceus (Muir).

Thyrocephalus croceus MUIR, Bull. Hawaiian Sugar Plant. Assoc., Div. Ent. (1913), 12, 39.

One pair from Mindanao, Davao (*Baker*), which I provisionally place under this species. In color and size it is similar to the following species (*L. pallidinervis*) from which it differs in the shape of its genitalia.

Ventral edge of pygophor straight, lateral edges obtuse-angularly produced, length of anal segment not quite thrice the width, sides subparallel, apex rounded, lateral edges near apex turned ventrad in the shape of an obtuse angle with acute apex, genital styles long and narrow, edges subparallel to near the rounded apex, apical portion curved slightly dorsad, two small knobs arise from middle of inner surface near base, one of which is studded with minute spines.

MINDANAO, Davao (*Baker*).

Lamenia pallidinervis sp. nov.

Male.—Reddish yellow, carinae of face, labium, tarsi, and dorsum of abdomen slightly fuscous. Tegmina hyaline tinged with yellow, veins lighter.

Ventral edge of pygophor straight, lateral edge angularly produced, which is subacute and longer than the width at base; anal segment long and narrow, length slightly less than thrice the width, sides parallel to near the rounded apex, anus a little basad of the middle, in profile the ventral edge entire; genital styles long and narrow, gradually narrowing to the acute apex, which is turned dorsad and inward; edges entire, a stout, acute spine arises from the middle of the inner surface, and a small round knob near the base.

Length, 2.5 millimeters; tegmen, 4.3.

Female.—Similar in color and size to the male. Pregenital sternite triangular, the sides sinuous.

MINDANAO, Zamboanga (*Baker*).

Genus *NEOLAMENIA* novum

This genus differs from *Lamenia* in having the second antennal joint as long as the face, broad, slightly flattened, sides subparallel, apex truncate, subantennal plate forming a narrow ledge below antenna; the basal half of clypeus forming an oblong disk, slightly depressed mediolongitudinally, the lateral

carinæ curved, forming the sides of the disk, median carina confined to apical half of clypeus.

Neolamenia flava sp. nov. Plate I, fig. 7.

Male.—Fuscous yellow, front coxae, mesonotum, and dorsum of abdomen darker fuscous. Tegmina fuscous yellow, opaque with waxy secretion, veins darker, infuscation greater along apical margin; wings white, opaque with waxy secretion, veins brown.

Posterior edge of pygophor straight, anal segment much longer than broad, apex bluntly conical, turned downward, with minute emargination at apex; styles as long as anal segment, subparallel-sided, apex bluntly pointed, turned inward, ventral edge slightly sinuous, dorsal edge having a small pointed process a third from apex.

Length, 3 millimeters; tegmen, 4.5.

Luzon, Laguna, Mount Maquiling (Muir); Basilan (Baker).

OTIOCERINÆ

Genus PYRRHONEURA Kirkaldy

Pyrrhoneura maculata sp. nov.

Male.—Lateral carinæ of face parallel. Light yellow, fuscous on abdomen; a black spot on carinæ of face in front of eyes, a spot on lateral margins of pronotum and a small one on lateral angles of mesonotum. Tegmina white, opaque with waxy secretion; veins white; a series of black dots as follows: Some five or six along costal cell, two in clavus, two on base of cubitus, one on apex of cubitus, one on base of first median sector, a larger one over middle of first and second sectors, first four and last three apical cells fuscous, fuscous clouding in apex of subcostal cell and at base of fourth sector; wings white with white veins.

Ventral and lateral edges of pygophor straight; anal segment long, narrow, parallel-sided, apex turned ventrad, truncate, anus near apex; genital styles long, narrow, apex bluntly pointed, turned inward, ventral edge nearly straight, dorsal edge with two rounded projections, or teeth, about middle.

Female.—Pregenital sternite wider than long, in lateral view slightly concave in middle, hind edge evenly produced to middle, slightly emarginate in middle, a fine, longitudinal groove from apex to near middle.

Length, 2 millimeters; tegmen, 3.5.

LUZON, Tayabas, Mount Banahao (Muir), cotype in College of Agriculture, No. 18123, on young coconut palms.

Genus **PHANTASMATOCERA** Kirkaldy

Phantasmatocera fuscofasciata sp. nov.

Male.—Head similar to that of *Swezeyia laratica*.⁴ Yellow; facial carinæ tinged with brown, a fuscous mark on lateral edges of pronotum, which extends across corners of mesonotum and to tip of tegmina. Tegmina hyaline, opaque with waxy secretion, veins white, a fuscous mark extending from base along clavus to median cross vein, then along media to apical cross veins; wings hyaline, opaque with waxy secretion, veins light yellow.

Ventral edge of pygophor straight, lateral edges slightly and roundly produced; anal segment long, narrow, sides straight, slightly narrowing to apex; apex broad, rounded, and turned ventrad, anus at apex; styles reaching a little beyond apex of anal segment, narrow, slightly curved upward at apex, rounded, turned inward, styles slightly compressed longitudinally, a carina running from apex to base on outer surface, ventral edge entire, dorsal edge notched near apex.

Female.—Shape of head as in *P. vitiensis* Kirkaldy.⁵ Light yellow; vertex and face above eyes white; a fuscous mark from face to front of eye and from back of eye to base of tegmen, along the middle of which it is continued to apex. Tegmina yellowish, opaque with waxy secretion; the fuscous mark proceeds from base of clavus along cubitus to medium cross vein then along media to apex; wings opaquely white, veins white.

Pregenital segment broader than long, posterior edge produced angularly from sides to middle, apex turned dorsad and depressed longitudinally so that from a ventral view it gives the apex of produced part the appearance of being angularly emarginate.

Length, 2.5 millimeters; tegmen, 3.6.

LUZON, Laguna, Los Baños and Mount Maquiling (Muir, Baker, Banks), cotype in College of Agriculture, No. 18122, females much more numerous than males; MINDANAO, Butuan, Davao (Baker).

⁴ *Swezeyia laratica* Muir, Bull. Hawaiian Sugar Plant. Assoc., Div. Ent. (1913), 12, 50, from Larat, is likely to be more correctly placed in *Phantasmatocera*.

⁵ Bull. Hawaiian Sugar Plant. Assoc., Div. Ent. (1906), 1, 431 (Fiji), (1907), 2, 177.

Genus DENDROKARA Melichar

Dendrokara MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 272.

Dendrokara monstrosa Melichar.

Dendrokara monstrosa MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 272.

Luzon, Laguna, Mount Maquiling and Paete (*Baker*); Mindanao, Butuan (*Baker*).

Dendrokara torva Melichar.

Dendrokara torva MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 273.

Mindanao, Lanao, Kolambungan (*Banks*), College of Agriculture No. 18104.

Genus NEODENDROKARA novum

This genus is differentiated from *Dendrokara* by the presence of a well-developed subantennal plate and of moderately developed shoulder keels. It approaches *Nesokaha*, but the long basal joint of antenna places it near *Patara*, a genus of which I have not seen a specimen.

Neodendrokara crescentiformis sp. nov. Plate I, fig. 8.

Male.—In profile, head oblong, longer than wide, no angle at junction of vertex and face; vertex acutely angular, base keelless, sides with high keels, face narrow, keels contiguous to apex; semicircular with slight antennal emargination on the ventral margin; antennae with first joint longer than wide; large second joint crescent-shaped, gradually thickened toward apex, which thick end is hollowed, second joint attached by its middle to the basal joint, large sense organs scattered over the whole surface; clypeus narrow, shorter than face, and laterally compressed, lateral carinae distinct, median indistinct; pronotum short, angularly emarginate behind, shoulder keels moderately developed; mesonotum longer than wide, lateral angles about middle, indistinctly tricarinate. Tegmina very similar to those of *Dendrokara torva*. Yellow, keels of face and sense organs on antennae reddish; tegmina yellow with yellow veins; cubitus, median sectors, and apex of media tinged with red.

Ventral and lateral edges of pygophor straight; anal segment narrow, long, tectiform; anus near apex, beyond which apex turned ventrad, roundly emarginate (forming a spine at each apical corner); genital styles narrow, reaching to end of anal

segment; dorsal edge entire, slightly curved dorsad, ventral edge produced at about middle, apex blunt, turned slightly inward.

Length, 3 millimeters; tegmen, 5.5.

Luzon, Tayabas, Mount Banahao (*Baker*).

Genus *NESOKAHA* Muir

Nesokaha lineata Muir.

Nesokaha lineata MUIR, Proc. Hawaiian Ent. Soc. (1915), 3, 120.

Male.—Ventral edge of pygophor straight; lateral edges obtuse-angularly produced; anal segment long, narrow, subparallel-sided, apex truncate, turned ventrad, anus at apex; genital styles narrow, reaching end of anal segment; apex bluntly pointed, turned inward.

This species was originally described from a female.

Luzon, Tayabas, Mount Banahao (*Muir*), on young coconut palms.

Nesokaha philippina Muir.

Nesokaha philippina MUIR, Proc. Hawaiian Ent. Soc. (1915), 3, 119.

Luzon, Mount Banahao (*Muir*), one female on a coconut palm.

Nesokaha rubrinervis sp. nov.

Male.—Clypeus, face, vertex, thoracic nota, and abdomen dark reddish fuscous; antennae, subantennal plates, thoracic sternites, and legs yellow; a fuscous mark between first and second coxae. Tegmina dark reddish fuscous, veins red, costa and apical veins lightest, subcostal apical cell slightly hyaline; wings dark fuscous, veins reddish.

Ventral edge of pygophor straight, lateral edges very slightly arcuate, anal segment longer than wide, sides slightly arcuate, apex roundly emarginate, anus at apex; styles narrow, reaching end of anal segment; apex subtruncate, turned slightly dorsad; a faint carina runs longitudinally along outer surface and is produced at apex into a small point.

Female.—Pregenital sternite convex, posterior edge obtusely produced to middle, a narrow emargination from apex of production to middle of sternite.

Length, 2 millimeters; tegmen, 3.5.

Luzon, Tayabas, Mount Banahao (*Muir*), on young coconut palms.

Nesokaha nigropunctata sp. nov.

Male.—Carinae of face contiguous. Yellow; head and pronotum lighter, dorsum of abdomen fuscous, tegulae black.

Tegmina light yellow, opaque with waxy secretion, veins on basal half yellowish, on apical half reddish, especially media and median sectors; a large, round, black spot at apex over fourth median sector, dark fuscous over basal half of costal cell, shading off into subcostal cell, dark fuscous over hind edge of clavus; wings fuscous, veins dark.

Ventral edge of pygophor straight, lateral edges slightly arcuate; anal segment longer than width at base, slightly narrowing toward apex, which is roundly emarginate, anus just before apex; genital styles reaching to end of anal segment, narrow, curved slightly dorsad, apex rounded, a small angular projection about middle on inner surface.

Length, 2.8 millimeters; tegmen, 4.

Luzon, Laguna, Los Baños (*Baker*).

Genus **KAHĀ** Kirkaldy

Kaha KIRKALDY, Ent. Bull. Hawaiian Sugar Plant. Assoc. (1906), 1, 433. (Feb. 3.)

Devadanda DISTANT, Fauna Brit. Ind., Rhyn. (1906), 3, 315.

Kirkaldy's work above quoted bears the date of publication, February 3. The exact date of publication of Distant's work I do not know, as the volume only bears the date of 1906, the introduction being dated February, 1906. It is highly probable that the publication of *Kaha* antedates that of *Devadanda*, because the introduction to Distant's work must have been written at least several days before the day of publication.

Devadanda differs from *Kaha* in the shape of the antennæ, a character which cannot be taken as of generic importance, as there is much specific and sexual difference in this group. The former genus was founded upon a single specimen, the sex of which is not mentioned, but it is probably a male; I do not think the description of the antennæ is morphologically correct, as the condition described is not found in the Derbidae or in the Fulgoroidea.

Nesokaha differs from *Kaha* in having the vertex and face, in profile, forming a continuous curve or with only a small angulation at the junction of vertex and face, the face not prolonged in front; the antennæ are simple in both sexes. It is possible that the two genera will have to be united.

Kaha flava sp. nov.

Female.—Yellowish; vertex and basal portion of face transparent, apically fuscous red, darkest between eye and middle of face; clypeus and lateral portions of pro- and mesonotum

fuscous; front and middle femora fuscous; abdomen reddish. Tegmina hyaline, semiopaque with waxy secretion, basal half light yellow, apical half fuscous, darkest in apical cells, a small black mark at base of costal cell, four fuscous marks across apical half of costal cell, a dark mark over cross vein at base of last median sector; veins yellowish on basal half, reddish, bordered with yellowish, in fuscous apical half; wings slightly fuscous with darker veins. Ventral edge of pregenital sternite produced angularly from sides to middle; anal segment small, anus at apex; a pair of short processes with a couple of hairs on apex of each arises from near apex on the ventral margin.

In profile the head of this species is not produced so far as in *K. media* Muir and is more conical; antennæ as in *media*.

Length, 2.25 millimeters; tegmen, 4.25.

Luzon, Laguna, Los Baños (Muir).

A damaged female from Mindanao, Butuan (Baker), is similar to this species.

Kaha pseudomedia sp. nov.

Male.—Head and antennæ as in *Kaha leefmanii* Muir. Dark shiny brown, tinged with red. In lateral view the vertex, basal portion of face, and a small angular mark in middle of face (most distal portion of head) white, rest of head brown, darkest around eye; subantennal plate and shoulder keel light; median carina of pro- and mesonotum lighter; legs light. Tegmina dark fuscous; four small, angular, white marks in apical portion of costal cell, the distal three being crossed by the red transcostal veins; two semihyaline patches in basal median cell, another in clavus, veins reddish, apical ones brightest; wings light fuscous, veins brown, a dark mark on the cross vein which arises from fourth median sector.

Ventral edge of pygophor straight, lateral edges slightly and roundly produced; anal segment long, narrow, subparallel-sided, bent ventrad at a right angle a little distad of middle; anus just distad of bend, apex truncate with a minute spine at each corner, straight basal portion sloping from middle to sides; styles long, narrow, apices rounded and turned dorsad, ventral edge subangularly produced before middle, dorsal edge produced into a small process about middle, basal portion of process round, with small hairs, distal portion produced into a small spine.

Female.—Posterior edge of pregenital sternite angularly produced from sides to middle, disk subconically produced in

middle, in side view the projection gradually rises from base to apex, then suddenly falls; anal segment small, anus at apex, apex produced into two small projections.

Length, 2.25 millimeters; tegmen, 3.5.

Luzon, Laguna, Mount Maquiling (Baker, Muir); Mindanao, Davao (Baker); Basilan (Baker).

There is one male specimen with a short, straight, anal segment that may represent a different species or may be an abnormal individual.

Kaha angulata sp. nov.

Male.—In profile the projecting face is acutely angular, whereas in *Kaha media* Muir it is more quadrate; antennæ with long "scales," but not so conspicuous as in *K. pseudomedia*. Dark shiny brown; viewed in profile, the genæ appear hyaline along basal half; a small hyaline spot beneath eye; legs lighter. Tegmina dark, a lighter spot across middle of costal cell; veins dark, reddish; apical and transcostal veins lighter red, a small dark mark over cross vein arising from fourth median sector; wings fuscous, veins dark.

Ventral edge of pygophor straight, lateral edges slightly and arcuately produced; anal segment broad and fairly short, sloping from middle to sides, in lateral view the sides excavated just before the rounded apex, anus at apex; style long and slender, apex rounded and turned slightly dorsad, projection on ventral edge more angular than in *K. pseudomedia*, that on dorsal edge angular with spine on apex.

Length, 1.75 millimeters; tegmen, 3.

Female.—Face not produced so greatly as in the male; viewed in profile, the produced face appears to be curved, thus approaching the genus *Nesokaha*; antennæ with lower portion of second segment slightly produced and bearing "scales." Dark shining brown, a thin, hyaline streak along vertex and base of genæ; legs pale yellow. Tegmina and wings as in the male.

Pregenital sternite angularly produced from sides to middle, disk near apex of production, produced into a low, conical process.

Length, 2 millimeters; tegmina, 3.5.

Mindanao, Butuan (Baker), Davao (Baker); Luzon, Mount Banahao and Mount Maquiling (Muir).

Allied to these new species of *Kaha*, there are several species of which the genitalia unfortunately have not been described, so that there will be some uncertainty until I can compare the types.

Genus EOSACCHARISSA Kirkaldy

Eosaccharissa philippina sp. nov.

Male.—Yellow; a fuscous spot on face in front of eye, fuscous on abdominal tergites. Tegmina hyaline, slightly opaque with waxy secretion, a faint fuscous spot in middle of costa, two at apex of radius, a more distinct spot at end of clavus, a faint yellow mark from end of clavus across base of radius to costa, slightly yellowish at base and over apical cross veins; wings hyaline, veins light.

Ventral edge of pygophor at middle produced into a square plate, the corners rounded, the dorsal surface with a median depression in which the aedeagus lies; lateral edges very slightly rounded; anal segment large, basal half slightly wider than long, sides slightly arcuate, bent ventrad second half much narrower, at right angles to basal half, apex roundly emarginate, anus at apex of first half; genital styles semispatulate, base narrow, dorsal edge slightly curved dorsad, ventral edge roundly produced on apical half, apex pointed, turned inward, a small spine about middle of inner surface.

Length, 3.6 millimeters; tegmen, 4.5.

MINDANAO, Butuan (*Baker*).

Eosaccharissa pulchra sp. nov.

Female.—The apical half of face is less rounded than in the type species. Light yellow; carinae on lower half of face black with a black mark across face to base of eye, genital styles fuscous. Tegmina white, veins white, five fine brown hair streaks from costa, one through middle of costal cell, two at apex, and two smaller a little beyond; a broader black mark from apex of media to apical cross vein, a small dark mark at end of clavus; yellowish along side of hair streaks, over cubitus and apex of median sector; wings white with white veins. Tegmina and wings opaque with waxy secretion.

Pregenital sternite produced in middle on posterior edge into a flat, conical process, length about twice the width at base.

Length, 2.5 millimeters; tegmen, 4.

Luzon, Tayabas, Mount Banahao (*Muir*), on young coconut palms; Laguna, Los Baños (*Muir*), cotype in College of Agriculture, No. 18121.

Eosaccharissa fusa sp. nov.

This species differs from the type in having the face in lateral view more conical in the middle, the costal cell broader, and the costal margin more arcuate. Yellowish; a mark across face

to eye, front and middle tarsi, marks on femora and tibiae, and abdominal tergites fuscous. Tegmina fuscous, hyaline in costal cell, clavus, and apical cells; two small black specks in median apical cells, veins dark, tinged with red; wings fuscous, veins dark.

Medioventral edge of pygophor produced into a long, acutely angular process; lateral edges straight; anal segment long and narrow, parallel-sided, anus just before apex, apex narrowly rounded and turned slightly ventrad; styles long, narrow on basal two thirds, apical third rounded.

Length, 3.6 millimeters; tegmen, 4.

Luzon, Laguna, Los Baños (*Muir*), Mount Maquiling (*Baker*).

The two specimens I have of this species are heavily covered with white, waxy secretion on tegmina and head.

Genus KAMENDAKA Distant

Kamendaka mindanensis sp. nov.

Male.—Vertex ascending, angulation of vertex with face acute, face narrow, but carinæ not contiguous.

Stramineous; dorsum of abdomen and facial carinæ fuscous. Tegmina hyaline variegated with stramineous and clear hyaline markings, the clear portions being the apex of clavus, the basal portion of cubital cell, the costal cell with the exception of three marks, one at base, one in middle, and one at apex, base and near apex of radial cell, three spots around base of first median sector, the third median cell, and some of the apical cells; the stramineous markings sometimes edged with fuscous; radio-apical and first, second, fourth, and fifth medioapical cells fuscous; veins stramineous in colored portion and white in clear portion.

Medioventral edge of pygophor produced into a process broader than long, the lateral edges arcuate and the apex truncate, the lateral edges turned dorsad and forming a canal in which the base of the aedeagus lies; anal segment narrow, sides subparallel, length more than twice the width, anus slightly before apex, segment narrows slightly beyond anus, apex broadly rounded; genital styles reaching to end of anal segment, curved dorsad, narrow at base, dorsal edge straight, entire, ventral edge arcuately ampliate on apical half, a small conical projection from ventral edge near middle, a small, stout spine with a curved apex about the middle of the inner surface of dorsal edge; aedeagus shown in fig. 1.

Length, 2 millimeters; tegmen, 3.5.

Female.—Similar to the male. Posterior edge of pregenital sternite roundly produced from sides to middle.

MINDANAO, Davao (*Baker*); Lanao, Kolambungan (*Banks*), cotype in College of Agriculture, No. 18105.

This and the three following species are similar in structure and color to *K. versicolor* Muir from Amboina, and they cannot be separated from each other except by the structure of the male genitalia.

Kamendaka lusonensis sp. nov.

Male.—Differs from *K. mindanensis* Muir in having the apex of anal segment not so narrow, the genital styles narrow at base,

apical half slightly wider with subparallel edges, apex subtruncate, a small, rounded projection on ventral edge near middle, a stout spine with curved apex on dorsal edge near middle; sdeagus shown in fig. 2.



FIG. 1. *Kamendaka mindanensis* sp. nov., aedeagus.

Luzon, Laguna, Mount Maquiling (*Baker*, *Muir*).

Kamendaka tayabasensis sp. nov.

Male.—Anal segment caudad of anus obtusely pointed; genital styles narrow, apical half but slightly broader than basal half, apex subacute; sdeagus very distinct (fig. 3).

Luzon, Laguna, Mount Maquiling (*Baker*).



FIG. 2. *Kamendaka lusonensis* sp. nov., aedeagus.

Kamendaka maquilingensis sp. nov.

Male.—Apex of anal segment round; genital styles long, very narrow, curved, slightly widened on apical fourth, apex subangular, a small process like a Phrygian cap about one third from base of the ventral edge, a curved spine in about the same position on the dorsal edge; sdeagus shown in fig. 4.

Luzon, Laguna, Mount Maquiling (*Muir*).

Kamendaka flava sp. nov.

Female.—The vertex in profile ascending, acutely angular at junction of face and vertex, carinæ of face near together at

FIG. 4. *Kamendaka maquilingensis* sp. nov., aedeagus.

base, but not contiguous. Yellow; tegmina semiopaque, yellowish, veins yellowish, four small black spots on apical margin of apical median cells.

Pregenital sternite very short at sides, hind margin steeply produced to middle, apex of production broadly pointed, sides slightly concave.

Length, 2.25 millimeters; tegmen, 3.5.

Luzon, Laguna, Mount Maquiling (Baker).

Kamendaka incommoda sp. nov.

In profile, vertex not so steeply ascending as in *K. flava* and face more strongly curved, thus approaching *Eosaccharissa* Kirk.

Male.—Dirty yellow, dark mark from middle of face to eye and from back of eye over posterior corners of vertex, light brown mark down middle of anterior half of mesonotum, fuscous over dorsum of abdomen; a black mark near base of hind tibiae. Tegmina hyaline, slightly fuscous over base and darker over posterior area to second median sector; a few faint spots in costal cell, one at base of media and one in middle of cubitus; veins yellowish with slight infuscation along the sides.

Medioventral edge of pygophor produced into a square plate with rounded corners and a median, longitudinal depression on the dorsal surface; anal segment little longer than its width at base, sides curved gradually to a point, anus median; over the anus a small conical plate, in lateral view, the segment sinuous; genital styles narrow at base, gradually widening to apex, which is subtruncate and diagonal.

Female.—A little darker in color than male. Pregenital sternite produced angularly from sides to middle.

Length, 2 millimeters; tegmen, 4.

Luzon, Laguna, Mount Maquiling (Baker).

Genus NICERTA Walker

Nicerta palawanensis sp. nov.

Female.—Congeneric with *Nicerta cruenta* Muir; antennæ slightly flattened.

Yellowish; antennæ fuscous, a small red streak from base of face to eye. Tegmina white, tinged with yellow; a series of red spots down the middle, first near base of media, another at forking of cubitus, a series through median cells to apex; wings white with white veins.

Posterior edge of pregenital sternite evenly and roundly produced from sides.

Length, 3.6 millimeters; tegmen, 5.5.

Palawan, Puerto Princesa (Baker).

Genus MEGATEOPIS Muir

Megatropis obliquefasciata Melichar.

In the females of this species that I have examined, the second antennal joint has little or no trace of the prong at its base. The oblique line is sometimes represented by only a dark mark at end of clavus and another on radius.

Luzon, Laguna, Mount Maquiling (*Baker*), College of Agriculture No. 18124.

Megatropis immaculata Muir.

Megatropis immaculata Muir, Bull. Hawaiian Sugar Plant. Assoc., Div. Ent. (1913), 12, 58.

MINDANAO, Butuan and Zamboanga (*Baker*); BASILAN (*Baker*). Previously known from Amboina and Borneo from females only; it is possible that *M. flexicornis* Muir is the male of *M. immaculata*.

In Philippine specimens the second antennal joint of the male varies from the horseshoe form of *M. flexicornis* Muir to the *M. pallida* Muir type with a short prong; in the female there is no prong, as in *M. coccineolinea* Muir.

Megatropis sanguinea sp. nov.

Male.—Head slightly narrower than in the type species, thereby approaching *Nicerta*; second joint of antennæ with a small knoblike prong at base; gena wide in front of eye, as in *M. rubella* Muir; the shape of eye approaches that of *Leptaleocera*. Head, thorax, and abdomen yellowish, heavily tinged with red, which is darkest on dorsal surface, abdomen infuscate. Tegmina deep scarlet, veins darker; wings fuscous with dark veins.

Ventral edge of pygophor straight, sides slightly arcuate; length of anal segment twice the width, sides slightly arcuate, apex rounded, anus in basal half; styles reaching apex of anal segment, narrow, dorsal edge entire, slightly curved, apex rounded, ventral edge produced into a triangular process in middle.

Length, 4 millimeters; tegmen, 6.

Female.—Second antennal joint without a knob or prong at base. Yellow tinged with red. Tegmina yellowish tinged with red; wings fuscous, veins darker.

Pregenital sternite with posterior edge produced into a wide, rounded process.

Length, 4.5 millimeters; tegmen, 6.5.

MINDANAO, Butuan (*Baker*).

In spite of the difference in color of the male and female as here described, I feel sure that they are of the same species.

Megatropis interruptolineata Melichar.

Megatropis interruptolineata MELICHAR, Phil. Journ. Sci., Ser. D (1914), 9, 271.

Luzon, Laguna, Los Baños (*Muir*), College of Agriculture No. 18125.

Genus **BANKSIELLA** novum

In profile vertex slightly excavate, ascending, angular at junction with face; face well rounded, forming a semicircle; vertex small, angular, slightly longer than width of base; lateral carinae broad and beset with wax pits; carinae continue onto face where they are contiguous to near apex; antennae very small, second joint little longer than broad, arista at apex; eye small, nearly round, very slight antennal emargination on ventral edge; clypeus shorter than face, rounded, carinae absent; pronotum short, hind edge angularly emarginate, in the middle acutely so; shoulder keels fairly well developed; mesonotum a little longer than wide, tricarinate, the lateral angles slightly behind middle, posterior angle acute; hind tibiae with a minute spine at base and a few small spines at apex. Tegmina with basal half of costa sinuous, then angularly emarginate, beyond which it is shallowly and arcuately emarginate, apex rounded, broad; precostal area confined to basal fifth, costal vein curved, subcosta and radius amalgamated to near apex, media parting from radius near base, first sector in apical third, cubitus forking beyond middle, second cubital cell closed; apex of clavus a little beyond middle of tegmen.

This strange little insect is very aberrant; by the closing of the second cubital cell and by the median sectors being confined to the apical third it falls into the *Nicerta* group, I should think somewhere near *Robigus*.

Banksiella pulchra sp. nov. Plate I, figs. 6 and 15.

Female.—Vertex and basal portion of face whitish, apical portion of face fuscous with two light marks passing over it; antennae, clypeus, and thorax brown, lighter over carinae and in middle of pronotum; femora fuscous; abdomen yellowish, fuscous at apex. Costal cell hyaline, basal fourth of tegmen light brown, darkest along the apical edge of this area, a triangular yellowish patch across tegmen, with its base on hind margin; the rest of the tegmen light reddish brown, except the apex,

which is yellowish, a series of lighter marks across costal cell; veins in apical half reddish, partly bordered with fuscous.

Length, 3 millimeters; tegmen, 4.5.

MINDANAO, Lanao, Kolambungan (*Banks*).

Genus LEPTALEOCERA Muir

Leptaleocera nigrofasciata sp. nov.

Male.—Second antennal joint only slightly flattened, nearly as long as head and thorax together, otherwise typical. The subcostal cell is shorter in *Leptaleocera* than in *Megatropis*.

Yellow; eyes, a small spot on each corner of mesonotum, and a line from base of clavus to apex of media black or fuscous brown; tegmen otherwise light yellow with light veins; wings white with whitish veins.

Posterior edge of pygophor entire; length of anal segment twice the width, sides straight, apex wider than base, very shallowly emarginate, apical corners with a minute spine, anus at about the middle; styles reaching to end of anal segment and of medium width; apex pointed and turned inward, with two small elevations on inner surface near apex.

Length, 4 millimeters; tegmen, 6.3.

Luzon, Mount Maquiling and Malinao (*Baker*).

Leptaleocera bakeri Melichar.

Leptaleocera bakeri MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 271.

The antennæ reach beyond the apex of head; they are large and flat. Ventral edge of pygophor straight; length of anal segment twice the width, parallel-sided, anus in middle, apex roundly emarginate; genital styles reaching to apex of anal segment, lanceolate, with apex turned inward.

MINDANAO, Lanao, Kolambungan (*Banks*), a male specimen, College of Agriculture No. 18106.

Leptaleocera banksi sp. nov.

Male.—This species differs from the typical form in having the antennæ subcylindrical and constricted in the middle; the second cubital cell is closed by the cubital veins. Hind tibiae broadened toward apex; hind tarsi short and broad, first tarsal joint about as broad as long, flattened. Scarlet, tibiae yellowish, abdominal tergites slightly fuscous.

Ventral edge of pygophor straight; lateral edges slightly arculate; anal segment considerably longer than broad, lanceolate, base broad, anus in middle, apex slightly curved ventrad; genital

styles reaching to end of anal segment, subparallel-sided to near apex, then narrowing to the pointed apex, which is turned inward; ventral edge entire, a small, round process on dorsal edge near apex.

Length, 3.6 millimeters; tegmen, 4.

MINDANAO, Lanao, Kolambungan (*Banks*), type, No. 18103, College of Agriculture; BASILAN (*Baker*).

This species is provisionally placed in *Leptaleocera*.

Genus HERONAX Kirkaldy

Heronax maculipennis (Melichar).

Fenuahala maculipennis MELICHAR, Phil. Journ. Sci., Sec. D (1914), 8, 436.

Male.—Ventral edge of pygophor produced very slightly and squarely at middle; from the inside of pygophor at the base of each style arises a curved spine, flat and broad at base and curved outward; lateral edges very slightly and angularly produced; anal segment long and with anus near base, widening suddenly from base to anus, then suddenly narrowing, the apex forming a long process which is turned downward and bifurcate at apex; genital styles spatulate, notched along lower edge; aedeagus large and complex.

Female.—Pregenital sternite angularly produced on hind margin, apex turned dorsad; anal segment very small, apex rounded.

Luzon, Tayabas, Lucena (*Banks*), Bureau of Science No. 18016; bred from nymphs taken from rotten stumps of buri palm, *Corypha elata* Roxb.

Genus MYSIDIOIDES Matsumura

Mysidioides tagalica sp. nov.

Male.—Head not angular at junction of vertex and face; antennæ flattened; media separating from radius at first sector. Fuscous yellow; darker over clypeus, face, lateral portions of pro- and mesonotum, and abdominal tergites. Tegmina hyaline, slightly fuscous, semiopaque with waxy secretion; darker infuscation in bands across costal cell, base of subcostal cell, along cubitus, over greater area of median cells, and in apical cells; veins fuscous in fuscous areas, yellow in hyaline areas, reddish along costa and on apical radial nerves; wings lightly fuscous with brown veins.

Ventral edge of pygophor straight, without spines on the inner median surface; lateral edge produced into a very small, angular projection; anal segment large, basal half straight,

subparallel-sided, anus in middle, apical half composed of two long spines at right angles to basal half; genital styles reaching beyond anal segment, somewhat spatulate, dorsal edge curved dorsad, ending in a strong spine, which is turned inward, ventral edge arcuately produced on apical half, notched about the middle, basad of the notch with two small, round projections on inner surface; aedeagus large and complex.

Length, 8.6 millimeters; tegmen, 5.

Female.—Similar to the male, but larger and the infuscation much darker. Antennæ club-shaped. The pregenital sternite is longer than broad, flattened or even slightly concave, posterior edge obtusely, angularly produced.

Luzon, Laguna, Mount Maquiling (Muir), on bird's-nest fern; Tayabas, Mount Banahao (Muir).

Unfortunately the genitalia of *Mysidiooides sordidum* (Muir) and *M. borneensis* (Muir) are not described, and I am not in a position to compare them with this species, but the coloration differs somewhat. The Banahao specimen is much darker and the red on the veins is much plainer.

I have other species, represented by females only, which I refrain from naming.

DERBINÆ

Genus ZEUGMA Westwood

Zeugma valdezi sp. nov.

Zeugma vittata MELICHR, MS. (not of Westwood).

Width of vertex and face as in *Zeugma javana* Muir, narrower than in *Z. vittata* (Westwood).

Brown or reddish brown; a dark longitudinal mark passing over vertex, face, and clypeus; five dark marks on mesonotum, the outer ones faint; abdomen darker; faint fuscous bands on first and second tibiae. Tegmina very light fuscous or reddish yellow, darker along veins, veins reddish brown, darker fuscous in subcostal cell, over apex of radius, and on apical cross veins, lighter areas around infuscated apical cross veins, in middle of median sectors, and over base of radial cell; wings fuscous, reaching a little beyond middle of tegmina, veins brown.

Ventral edge of pygophor produced into a short, wide process at middle, the apex widely and angularly emarginate; lateral edges produced into wide angular plates, the ventral edge of projection obtusely, angularly produced in middle; anal segment a little longer than lateral plates, longer than broad, widest near apex, which is round with a slight angular emargination, making

it subcordate in outline, the lateral edges turned ventrad, anus in middle; genital styles much longer than anal segment, gradually widening from base to middle then narrowing to the apex, which is produced as a long, fine point, apical third turned dorsad and inward.

Female.—Like the male. Pregenital sternite angularly produced on hind margin, apex of projection turned dorsad; a slight depression across middle of sternite.

Length, 5 millimeters; tegmen, 10.

Luzon, Laguna, Mount Maquiling; MINDANAO, Davao and Butuan (*Baker*).

I name this species for Julian Valdez, Professor Baker's Cuban collector.

Genus ZORAIDA Kirkaldy

Thraecia WESTWOOD, Trans. Linn. Soc. (1842), 19, 10.

Zoroida KIRKALDY, Entomologist (1900), 242 n. nom.

Besides the nine species enumerated below, there are several species represented by females only, which I refrain for the present from describing.

- a'. Tegmina colored or maculate, more or less, all over.
- b'. Tegmina fuscous all over with small white spots along the red veins. *insulicola*.
- b'. Tegmina fuscous brown over costal, subcostal, and radial areas with fuscous spots along cubital and median veins. *maculata*.
- c'. Tegmina not maculate or not maculate over the median and cubital area.
- c'. Tegmina all clear hyaline or with the costal, subcostal, and radial areas yellowish or very light brown.
- d'. Anal segment of male with apical third turned ventrad at right angle to basal two thirds, apex pointed *javanica*.
- d'. Anal segment of male straight or only slightly curved ventrad.
- e'. Anal segment of male long, narrow, tapering to an acute point. *westwoodii*.
- e'. Anal segment of male not acutely pointed at apex.
- f'. Anal segment of male rounded at apex, medioventral process fan-shaped *lutescens*.
- f'. Length of anal segment of male nearly twice the width, apex conical and curved slightly ventrad. *hyalina*.
- c'. Tegmina dark brown or dark fuscous over costal, subcostal, and radial areas, sometimes extending into median area.
- g'. Costal, subcostal, and radial areas fuscous brown; dorsal surface of body brown, ventral surface yellow; anal segment of male short with rounded apex *flaviventris*.
- g'. Costal, subcostal, and radial areas brown, extending into median area at base of sectors.
- h'. Anal segment of male long, narrow, apex acute. *sinuosa*.
- h'. Anal segment of male short, broad apex blunt. *meliolari*.

***Zoraida insulicola* Kirkaldy.**

Zoraida insulicola KIRKALDY, Bull. Hawaiian Sugar Plant. Assoc., Div. Ent. (1913), 12, 69.

This may be *Zoraida cumulata* Walker; if so the original description makes no mention of the red veins, the white spots along veins, and the light costal margin.

Luzon, Laguna, Mount Maquiling, Los Baños (*Banks*), College of Agriculture No. 18133; MINDANAO, Davao (*Baker*).

Previously known from Amboina.

***Zoraida maculata* sp. nov.**

Antennae a little longer than face. Light brown, dorsum of abdomen fuscous with a lighter spot in middle, this spot and the scutellum often covered with waxy secretion. Tegmina hyaline; costal, subcostal, and radial areas brown or fuscous brown, extending to median area at bases of sectors; white spots on basal half of costal and along radial cells; subcosta, radius, and media reddish; median sectors and cubitus brown with fuscous marks along them, most distinct at apices on hind margin, four pairs of brown spots near apex, one on each side of each apical vein. Wings reaching to base of first median sector of tegmina, hyaline, veins brown.

Medioventral process of pygophor angularly lanceolate with the lateral angles near base, lateral edges of pygophor roundly produced; anal segment about the length of remainder of abdomen, narrowly lanceolate, apical fourth turned ventrad, apex narrow, shallowly emarginate, anus slightly before middle, basad of anus the dorsal surface slopes to the sides; genital styles large, reaching to apical fourth of anal segment, base narrow, apical half subquadrate, a carina proceeds from base to apex, forming the ventral edge on the basal half and the dorsal edge at apex, a round knob on ventral edge near base, the dorsal edge near middle forming an angular point.

Length, 4 millimeters; tegmen, 13.

Female.—Slightly darker than the male. Posterior edge of pregenital sternite slightly and roundly produced on middle half; anal segment slightly longer than wide, subturbinate, apex with a small emargination.

Length, 4 millimeters; tegmen, 10.25.

MINDANAO, Butuan (*Baker*), male, type; Davao (*Baker*), Lanso, Kolambungan (*Banks*), female, cotype in College of Agriculture, No. 18108.

Zoraida javanica (Westwood).

Thrauta javanica Westwood, Trans. Linn. Soc. London (1842), 19; STÅL, Öfv. Vet. Akad. Förh. (1870), 27, 750.

I have seen no Philippine specimens of this species. Those so named that I have seen do not agree with my specimens from Java.

Zoraida westwoodii (Stål).

Thrauta westwoodii STÅL, Öfv. Vet. Akad. Förh. (1870), 27, 751.

Male.—Ventral edge of pygophor angularly produced in middle, the apex rounded; lateral edges sinuous, roundly produced at sides of anal segment; anal segment longer than abdomen, slightly widening to anus (which is about one third from base), then gradually narrowing to a long, pointed apex, sinuous in profile; genital styles very long, narrow at base, dorsal edge roundly produced at about the middle, ventral edge sinuous, apex pointed and turned inward.

Female.—Pregenital sternite wider than long, posterior edge very slightly and roundly produced; anal segment about as broad as long, round, apex with a small emargination. The female is larger than the male.

There is a specimen marked *westwoodii*, Bureau of Science collection No. 5371, that is very slightly darker in color and in which the pregenital sternite is longer, the posterior edge more fully produced, and with an angular emargination in middle; the anal segment more conical in outline, and its apex not emarginate.

LUZON, Laguna, Los Baños (*Baker*).*Zoraida lutescens* sp. nov.

Male.—Antennæ a little longer than face. Ochraceous, carinae of mesonotum lighter, fuscous over abdominal tergites. Tegmina hyaline, light ochraceous over costal, subcostal, and radial cells, veins ochraceous. Medioventral process of pygophor wider than long, forming a wide arc slightly constricted at the corners, making it somewhat fan-shaped, lateral edges of pygophor produced into a small, acute angle; width of anal segment about twice the length, anus in middle, apex rounded, lateral edges turned ventrad, a small transverse ridge basad of anus, in profile ventral edge convex; genital styles large, narrow at base, wide on apical half, sublanceolate, on the ventral edge there are two small emarginations basad of the middle, dorsal edge sinuous basad of the middle.

Length, 3.5 millimeters; tegmen, 8.5.

Female.—In coloration similar to the male. Pregenital sternite wider than long, very slightly and obtuse-angularly produced from sides to middle; anal segment about as wide as long, lanceolate, acute-angularly emarginate at apex.

Length, 4 millimeters; tegmen, 8.5.

LUZON, Laguna, Los Baños (*B. R. Bautista*), cotype in College of Agriculture, No. 18326; Manila (*H. Loewinsohn*) Bureau of Science No. 15802, (*Banks*) Bureau of Science No. 14242.

Zoraida hyalina Melichar.

Zoraida hyalina MELICHAR, Notes Leyden Mus. (1913), 36, 97.

One male agrees with Melichar's description of this Javanese species; the costal, subcostal, basal half of radial, and base of median cells slightly yellowish. A white, waxy secretion over scutellum.

Ventral edge of pygophor angularly produced in middle; lateral edges angularly produced; length of anal segment nearly twice the width, parallel-sided, apex conically rounded and turned slightly dorsad, anus in middle with a small projection just in front of it, in lateral view the ventral edge curved dorsad; genital styles reaching to end of anal segment, spatulate, base narrow, apex bluntly pointed, dorsal edge with a small emargination near apex, ventral edge with a small emargination before middle and slightly sinuous basad of emargination.

LUZON, Laguna, Los Baños (*Baker*).

Zoraida flaviventris sp. nov.

Male.—Antennæ a little longer than face. Head, antennæ, legs, and ventral surface of thorax and abdomen yellow, dorsal surface fuscous brown, scutellum and four spots (sense organs?) on fifth and two on sixth abdominal tergites yellow. Tegmina hyaline, veins brown, costal, subcostal, and radial cells dark fuscous brown.

Ventral edge of pygophor roundly produced, width nearly twice the length, a depression at each corner and a small longitudinal carina down middle; anal segment longer than wide, apex broadly rounded, base slightly constricted, anus about middle, a small ridge between anus and base, lateral edges turned ventrad, in lateral view ventral edge deeply convex or even subangular; genital styles reaching to apex of anal segment, subspatulate, apex broadly pointed, a round knob on dorsal edge near base, a quadrate process, which is broader than long, on ventral edge near middle.

Length, 4 millimeters; tegmen, 9.7.

MINDANAO, Agusan River (*W. Schultze*), Bureau of Science collection.

Female.—Three specimens from Mindanao are a little darker than the male. Pregenital sternite a little broader than long, posterior edge obtusely angularly produced from sides to middle, a small emargination at apex of production; anal segment very little longer than broad, sides rounded, apex truncate or very obtusely angularly emarginate.

MINDANAO, Davao (*Baker*).

Zoraida sinuosa (*Bohemian*) ? Plate I, fig. 14.

Derbe sinuosa BOHEMAN, Kgl. Sv. Vet. Akad. Handl.

In the Baker collection there are specimens under the above name (determined by Melichar), and in the Bureau of Science collection the same species stands under the name *Z. javanica* (Westwood). That it is the former (African) species, I doubt; and I do not consider it to be the latter species, as it does not agree with specimens that I have from Java. I leave it under Boheman's name until I can examine, or learn more about, the type of *Derbe sinuosa* Boh.

Male.—Ventral edge of pygophor produced at middle into a subturbinate process; lateral edges obtusely angular at sides of anal segment; anal segment long, projecting more than half beyond lateral projections, anus cephalad of middle, in dorsal view the sides subparallel as far as anus, then gradually narrowing to the sharply pointed apex, in lateral view curved ventrad, beaklike; genital styles as long as anal segment, ventral edge straight with a curved emargination about middle, dorsal edge produced angularly beyond middle, apex bluntly pointed, a small round knob with a minute curved spine on inner margin before middle.

Female.—Pregenital sternite longer than wide, hind edge sub-angularly produced from sides to middle; anal segment small, little longer than wide, subturbinate.

PALAWAN, Malampaya (*Schultze*), Bureau of Science No. 18908; LUZON, several localities. This appears to be the commonest species of *Zoraida* in the Philippines.

Zoraida melichari sp. nov. Plate I, fig. 18.

Male.—Subcosta and radius separating about middle of tegmen, subcosta faint, radial cell narrow, slightly widening toward apex, with a "false vein" down the middle; four cubital veins reaching hind margin; four median sectors.

Yellow or light brown, granulations on antennae darker, a dark mediolateral mark on abdomen, genitalia reddish; a white,

waxy secretion at times covers the scutellum and middle line of abdomen. Tegmina hyaline; subcosta, radius, media (but not sectors), and base of cubitus reddish, other veins light brown; base of cubitus, base of median cell to first sector, radial, subcostal, and costal cells to apex fuscous, the dark color passing over base of second sector to first, and over base of third and fourth sectors and radial apical cross vein, lightly fuscous between veins on apical margin, the apices of veins there being lighter; wings reaching nearly to middle of tegmina, hyaline, with brown veins.

Ventral edge of pygophor at middle with a subangular process, a little longer than width of base, apex rounded; lateral edges broadly and bluntly angular at sides of anal segment; anal segment extending about a third beyond lateral projections, anus at about middle, in dorsal view sides subparallel or slightly concave, apex broadly rounded; genital styles reaching slightly beyond anal segment, dorsal edge angularly produced before apex, a small, round knob on inner border before middle, ventral edge with a small, curved emargination beyond middle, apex broadly angular.

Female.—Pregenital sternite subangularly produced from sides to middle; anal segment a little longer than wide, subtubinate.

Length, 4 millimeters; tegmen, 9.5.

MINDANAO, Lanao, Kolambugan (*Banks*), cotype in College of Agriculture, No. 18109, Davao (*Baker*).

In coloration this species is like the next preceding, but the short anal segment in the male, with its rounded apex, and the shorter and blunter genital styles distinguish it. The Davao specimens are darker than those from Kolambugan.

Genus LOSBANOSIA novum

Head considerably narrower than thorax; vertex quadrate, apex truncate, narrower than base, disk excavate; face narrowing between eyes, then widening below eyes, again narrowing slightly, then widening; no distinct demarcation between face and clypeus, lateral carinæ of vertex continued down face to below antennæ; eyes round, bulging, with exceedingly small antennal emargination on ventral edge; length of clypeus subequal to face, lateral carinæ small, median carina distinct, continued onto face for some distance; antennæ cylindrical, as long as head and thorax together; thorax, legs, and abdomen as in *Zoraida*. Radius arising from subcosta about one fourth from base, subcostal cell very narrow; median vein very close to radius as far

as apical fourth, median basal cell short and broad, first median sector joined to cubitus, making four cubital veins; four simple median sectors (not counting one joined to cubitus); hind margin angularly excavate at apex of each cubital and median sector, giving the hind margin a serrated edge; wings reaching to apex of abdomen, lanceolate; a large anal stridulating area.

The neuration of this genus is similar to that of *Diostrombus*; but the radial and the media are much nearer together, and the first median sector is furcate and more closely associated with the cubitus.

Losbañosia bakeri sp. nov. Plate I, fig. 4.

Female.—Brown; apex of clypeus, labium, legs, and hind border of mesonotum lighter; head and pronotum darker, the latter speckled with white granules, a few light dots on mesonotum and many on abdomen, abdominal segments tinged with red, anal style red. Tegmina hyaline, dark fuscous over basal half of costal and entire subcostal and radial cells, the dark color expanding to hind margin at extreme base and over basal portions of cubital veins, also over basal portions of first and second median sectors, and over apical cells and veins, each "tooth" on hind margin fuscous; veins yellowish in hyaline portion of tegmina, red in fuscous portion; apical portion of costal cell with red and white splashes, red and white dots along costa, subcosta, radius, and media; wings hyaline, veins red, fuscous at apex and along veins, apex rounded. Pregenital segment longer than broad, in lateral view concave in middle, posterior edge angularly produced in middle, between the angular projection and genital styles there is a small, quadrate, black plate; anal segment small, about as broad as long, anus at base, beyond which it forms a half cylinder, apex slightly emarginate; genital styles well developed, as in *Zoraida*.

Length, 4.5 millimeters; tegmen, 10.

Luzon, Mount Maquiling (Baker, Muir).

Unfortunately I have seen only female specimens.

Genus PEGGIA Kirkaldy

Nebrisca STÅL, Öfv. Vet. Akad. Förh. (1870), 27, 751 (name preoccupied).

Peggia KIRKALDY, Entomologist (1901), 34, 6 (new name).

Peggia nitida (Stål). Plate I, fig. 1.

Nebrisca nitida STÅL, Öfv. Vet. Akad. Förh. (1870), 27, 751.

I have seen no specimen that I can identify with any satisfaction as *P. nitida*. This is to be regretted, as it prevents me from

defining the genus with any certainty. That it may clash with *Peggiopsis* Muir is probable. One female specimen in the Bureau of Science collection, which stands under this name, does not agree very well with Stål's description. I accept it provisionally and associate two other specimens with it. The following description is taken from the above-mentioned specimen:

Vertex quadrate, base wider than apex; face narrow with a fine longitudinal groove in the center; clypeus much longer than face, tricarinate, sides flattened; antennæ longer than head and thorax together, narrow, flat, sense organs evenly distributed; mesonotum broader than long, carinæ obsolete. Tegmina with costal cell arcuately produced at base, distad of which it is exceedingly narrow; radial cell so narrow from base to near third median sector that the median vein appears to be united to the radius, beyond this point it widens suddenly; four median sectors and four cubital veins; wings rudimentary, not reaching to middle of abdomen. Dark brown; head, dorsal half of antennæ, pleuræ of pronotum, legs, and middle of abdomen lighter brown. Tegmina hyaline with reddish brown veins, basal portion to first median sector fuscous with two small, hyaline spots in middle, a dark fuscous mark at apex of subcosta, extending along radius to apex of media. Pregenital sternite wider than long, posterior edge obtuse-angularly produced from sides to middle, disk subconcave when viewed in profile; anal segment small, broadly lanceolate, apex slightly emarginate.

NEGROS, Occidental Negros, Bago (*Banks*), Bureau of Science No. 6631.

Peggia irrorata sp. nov. Plate I, fig. 16.

Male.—Vertex very short, broad; face broadest at base, slightly narrowed between eyes, carinæ fine, not contiguous; antennæ as long as head and thorax combined, flattened; thorax similar to that of *Zoraida*; abdomen slightly compressed, dorsally arched. Costal cell exceedingly narrow, especially beyond basal fourth; subcosta and radius separating about one fourth from base, but they remain so near together that they are practically contiguous to near apex; radial cell very narrow to near apex where it widens very slightly. Cubitus with four veins extending to hind margin, the fifth joining a cross vein near margin; four median sectors; wings minute, not reaching middle of abdomen. Brown, a median and lateromedian lighter marks on mesonotum, the lateral edges of pronotum light with two small dark marks; abdomen dark brown, speckled all over with lighter granules.

Costa, subcosta, and radius with apical veins reddish, costal and subcostal cells yellowish, other veins fuscous brown, fuscous in radial cell and less distinctly so in apical cells, rest of tegmina hyaline; wings hyaline with brown veins.

Ventral edge of pygophor produced in middle into a lanceolate process, which is a little longer than broad; lateral edges angularly produced at sides of anal segment, the apex acutely pointed; anal segment longer than broad, slightly narrowed before middle, apex rounded, anus a little beyond middle, a small, elevated ridge immediately basad of anus; genital styles reaching to end of anal segment, apices rounded, ventral edges arcuately excavate on distal half, dorsal edges slightly angular about middle.

Length, 3.5 millimeters; tegmen, 9.

Female.—Like the male, but with three light marks across radial cell near the first, third, and fourth median sectors. Pre-genital sternite a little broader than long, posterior edge obtuse-angularly produced from sides to middle, disk in middle concave.

Luzon, Laguna, Mount Maquiling (*Muir*); Ilocos Norte, Dungon Dungon (*Banks*), a pair taken in copula, cotype in College of Agriculture, No. 18327.

Genus PEGGIOPSIS Muir

Peggiopsis Muir, Bull. Hawaiian Sugar Plant. Assoc., Div. Ent. (1913), 12, 72.

Most of the species of this genus are easily distinguished from species of *Zoraida* Kirkaldy by the broad, flat antennæ, but a few species have the antennæ narrower and not so distinctly flattened. In all such species the wings are rudimentary and do not reach to the end of the abdomen. It is possible that this genus may clash with *Peggia* Kirkaldy, the type of which I am uncertain about.

The nine species I place under this genus are distinguished as follows:

Key to the species of *Peggiopsis*.

- a¹. Wings reaching to the end of abdomen or beyond.
 - b¹. Antennæ longer than head and thorax together; each of four abdominal tergites with a row of black spots; anal segment of male long, apex acute, apical third turned ventrad, forming a right angle with basal portion *dorsimaculata*.
 - b². Antennæ not longer than head and thorax together; abdomen without black spots.
 - c¹. Veins of tegmina yellow; apex of male genital style truncate. *pallida*.

- c'. Veins of tegmina brown; apex of male genital style forming a long, blunt spine turned inward *pseudojavana*.
- a'. Wings rudimentary, not reaching to the end of abdomen.
- d'. Antennae not longer than head and thorax together. Veins of tegmina yellow; anal segment of male longer than broad, subquadrate, narrowing to apex which is emarginate..... *puncticosta*.
- d'. Antennae distinctly longer than head and thorax together.
- e'. Three rows of black spots on dorsum of abdomen..... *dorsopunctata*.
- e'. Without such black spots.
- f'. Anal segment of male long, narrow, apex subacute; antennae with dark band near apex..... *pseudopuncticosta*.
- f'. Anal segment of male with rounded apex or with small emargination.
- g'. Medioventral process of male pygophor triangular....*flavicornis*.
- g'. Medioventral process of male pygophor lanceolate.
- g'. Medioventral process of male pygophor spatulate with acute apex *stali*.

Peggiopsis dorsimaculata sp. nov.

Male.—Wings reaching beyond apex of abdomen; antennae about as long as head and thorax together, flattened, sense organs most numerous along the raised edges. Ochraceous, thorax slightly fuscous, abdomen lighter, antennae yellow with red sense organs, the second to sixth abdominal tergites each with a row of raised black spots (sense organs?), anal segment tinged with red. Tegmina hyaline, very slightly fuscous, subcosta, radius, and media red, median sectors and cubital veins brown, fuscous over basal portion of costal and radial cells, darker fuscous over radial cross vein, base of sectors, apex of third sector, and subcostal cell; wings fuscous hyaline with brown veins.

Medioventral process of pygophor lanceolate, the length about twice the breadth; anal segment lanceolate, length about four times the width, apex blunt, apical third turned ventrad; anus about one third from base, dorsal surface longitudinally ridged from base to anus; genital styles reaching to bend in anal segment, base narrow, wide distad of middle, ventral edge sinuate, a carina near, and parallel to, ventral edge, dorsal edge roundly ampliate on apical two thirds, a small transverse carina between dorsal edge and ventral carina, apex narrowly truncate, the corners forming broad points, those on the right styles more pronounced than those on the left.

Female unknown.

Length, 4 millimeters; tegmen, 13.

MINDANAO, Davao (*Baker*).

Peggiopsis pallida sp. nov. Plate I, fig. 13.

Male.—Antennæ scarcely as long as head and thorax together; face not produced below eyes; a longitudinal "false vein" in the apical half or radial cell. Light yellow, sense organs on the antennæ brownish. Tegmina hyaline, slightly opaque with waxy secretion, veins light yellow.

Length, 2.7 millimeters; tegmen, 8.5.

Female.—Similar to the male. Pregenital sternite wider than long, posterior edge obtuse-angularly produced from sides to middle; anal segment a little longer than broad, sides arcuate, apex roundly pointed, anus at base.

Length, 2.5 millimeters; tegmen, 8.5.

LUZON, Laguna, Los Baños (*Baker*), Mount Maquiling (*Baker*, *Muir*); NEGROS, Occidental Negros, Bago (*Banks*), Bureau of Science No. 6632.

Peggiopsis pseudojavana sp. nov.

Male.—Antennæ hardly as long as head and thorax, flat; tegmina and wings as in *P. pallida*. Yellow, inclining to red on dorsum; tegmina hyaline, subcosta, radius, and base of median vein yellowish; rest of veins brownish; wings hyaline, veins brown.

Ventral edge of pygophor produced into a small process, longer than broad, narrowing to the bluntly pointed apex; lateral edges forming an angle at sides of anal segment; anal segment large, longer than broad, slightly constricted at base, rounded at apex, which is turned ventrad; anus before middle; genital styles narrow, about as long as anal segment, apex forming a long blunt spine turned in at right angles to basal portion, ventral edge straight, with a round process about a third from base, dorsal edge slightly arcuate.

Length, 2.7 millimeters; tegmen, 7.

MINDANAO, Butuan (*Baker*).

A female from Los Baños (*Muir*) that I associate with this species is less red in color, front femora with fuscous streak, hind tibiae with middle and apical spines black, and a black mark on apical half; anal segment red. Hind edge of pregenital sternite slightly and roundly produced from sides to middle, wider than long, with a wide depression along middle. Another female from Basilan (*Baker*), which could equally well belong to this species, has the basal portion of the disk drawn out into a blunt spine.

Peggiopsis puncticosta (Melichar).

Zoraida puncticosta MELICHAR, Phil. Journ. Sci., Sec. D (1914), 8, 433.

The long, flat antennæ and the rudimentary wings place this species in the genus *Peggiopsis*. One male in the Baker collection from the type locality (Mount Maquiling) that agrees with Melichar's description has the genitalia as follows: Medioventral process of pygophor acutely triangular, the length about twice the width at base; anal segment subquadrate, length about twice the width at base, the width of apex about half that of the base, apex slightly emarginate, anus near middle; genital styles large, narrow at base, gradually widening to apex, which is truncate with rounded corners, dorsal edge concave, ventral edge convex, a small subangular process on ventral edge near base.

Peggiopsis dorsopunctata (Melichar).

Zoraida dorsopunctata MELICHAR, Phil. Journ. Sci., Sec. D (1914), 8, 434 (Mount Maquiling).

The long, flat antennæ indicate that this is not a *Zoraida*.

I have one specimen that may be the female of this species. Face in profile slightly projecting below eyes; antennæ flat, half as long as head and body, edges subparallel; cubitus with six veins extending to hind margin. Yellow, edges of antennæ reddish; mesonotum slightly fuscous, dorsal edges of tegulae fuscous, two spots on scutellum, second, third, and fifth abdominal tergites, each with two spots, anal segment reddish. Hind margin of pregenital sternite obtusely, angularly produced from sides to middle, disk flattened; anal segment longer than wide, sides very slightly arcuate, narrowed toward apex, which has a distinct angular emargination; anus at about middle.

LUZON, Los Baños (*Muir*).*Peggiopsis pseudopuncticosta* sp. nov.

Antennæ flat, broad, as long as thorax and abdomen together; wings not reaching to the middle of the abdomen; apical half of costal cell narrow; radial cell narrow to the cross vein, beyond which it is wider. Light brown, reddish over the abdomen; slightly fuscous near base of antennæ and a dark band near the reddish apex, three dark marks on mesonotum, which are broadest posteriorly. Tegmina hyaline with yellowish veins, costal cell with a series of some forty minute black spots.

Medioventral process of pygophor conical in outline with an acute apex; lateral edges obtusely angled; anal segment long

and narrow, length about thrice the width of base, anus slightly distad of middle, sides subparallel to anus then slightly converging to the rounded apex; genital styles boomerang-shaped, widest on apical half, ventral edge concave, a rounded emargination basad of middle of dorsal edge.

Length, 3.3 millimeters; tegmen, 9.

MINDANAO, Davao (*Baker*).

Peggiopsis flavicornis (Melichar). Plate I, fig. 11.

Zoraida flavicornis MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 433.

The large, flat antenna places this species in *Peggiopsis*. In the specimens I identify as this species, the subcosta leaves the radius level with the first median sector; it is very obscure and parallels the radius to the apex; the costal area is narrow, especially in the distal half, but distinct; radial cell very narrow to halfway between second and third median sectors, then suddenly broad to apex; four cubital veins reaching posterior margin, the first median sector forming part of the cubital system; four median sectors. Vertex triangular, depressed in middle, lateral carinæ meeting at apex; face elongate diamond-shaped, widest below eyes, a fine hair line divides carinæ on middle of face, the latter diverging at apex.

Male.—Medioventral edge of pygophor produced into a small triangle turned dorsad; lateral edges straight; length of anal segment about twice the breadth, slightly narrowed at middle, rounded toward apex, where there is a slight emargination, anus in middle, a small ridge across segment just basad of anus; genital styles longer than anal segment, narrow, curved dorsad, inner surface concave, outer convex, narrowest at base, apex rounded, slightly constricted near apex.

Female.—Pregenital sternite convex, wider than long, posterior margin obtuse-angularly produced from sides to middle; anal segment a little longer than broad, sides slightly arcuate, narrowing slightly to the emarginate apex, anus at base, a small angular projection from preanal tergite covering the base.

Luzon, Laguna, Los Baños (*Muir*), College of Agriculture No. 18132.

Peggiopsis pseudoflavicornis sp. nov. Plate I, fig. 10.

Male.—In profile the face below eyes projects slightly; antennæ as long as body, flat and broad, otherwise as in *P. flavicornis*; in color similar to *flavicornis*, but without the fuscous shading on mesonotum and the spots on scutellum.

Ventral edge of pygophor produced in middle into a broadly lanceolate process; lateral edges projecting angularly beside anal segment; anal segment longer than broad, narrowing to the apex, which has a minute emargination, anus in middle, a small projection arising basad of anus; genital styles longer than anal segment, concavo-convex, narrow at base, apex rounded, ventral edge with a large notch near apex and a small one more basad, dorsal edge with two small projections near the middle. These styles are larger and wider than in *P. flavicornis*.

Length, 3.3 millimeters; tegmen, 10.

Luzon, Tayabas, Malinao (Baker).

Peggiopsis stali sp. nov.

Male.—Antennæ flat, longer than head and body, narrowed toward base and apex; face not distinctly protruding below eyes. Tegmina with four cubital veins extending to hind margin, four median sectors; subcostal cell very narrow, commencing about middle of tegmen; radial cell very narrow at base, gradually widening to apex; costal cell distinct, but narrow, slightly wide in basal third; wings rudimentary, not reaching to middle of abdomen.

Ventral edge of pygophor produced into a spatulate process with the apex drawn out to a fine point, slightly laterad of this process provided with two small knobs, lateral edges bluntly angular at sides of anal segment; anal segment much longer than wide; parallel-sided, turned ventrad at apex; apex wide, roundly emarginate, anus in middle, a small ridge basad of anus, genital styles not so long as anal segment, narrow at base, widening to the truncate apex, dorsoapical corner produced into a rounded point, ventral edge sinuous, dorsal edge with two small processes near middle, the distal one rounded, basal one a bent, blunt spine.

Yellow, facial carinæ and edges of antennæ tinged with red, lateral edges of pronotum red, fuscous on sides of abdominal tergites, anal segment red. Tegmina hyaline, basal third of costal cell yellow, apical two thirds of costal cell, subcostal cell, and basal portion of radial cell red, middle portion of radial cell fuscous; costa, subcosta, and radius red; other veins brown, color in three apical veins fades out at apex.

Length, 3 millimeters; tegmen, 8.75.

Mindanao, Lanao, Kolambugan (Banks).

Certain characters of this species approach those of the genus *Peggia* (*Nebrissa* Stål).

Genus **MINDANA** novum

Vertex very short and very broad with a fine carina around the edges; face as broad as the vertex, constricted on lower half between antennæ, the fine carinæ of vertex continued down the center of the face with a fine groove between them, no distinct carinæ on lateral edges; eyes round with a small antennal emargination on lower edge; clypeus longer than face, carinæ obsolete; antennæ large and flat. Costal cell narrow on basal fourth, beyond which it is practically obsolete, subcostal cell very narrow, radial cell very narrow to cross vein, beyond which it widens considerably, cubitus with four veins reaching hind margin, media with four sectors; wings rudimentary, not reaching to middle of abdomen. Genital styles of female well developed.

Mindana latifrons sp. nov. Plate I, fig. 12.

Antennæ longer than thorax and abdomen together, arista a little cephalad of apex, beyond which the apex is subacute; surface studded with brown sense organs, which are most numerous around the edges. Tarsi and apices of femora fuscous; abdomen with two dark, shining bands across dorsum broken in the middle; genitalia dark fuscous. Tegmina clear hyaline, dark fuscous over apical half of costal and all subcostal areas, extending at apex of tegmen to apex of media, veins dark fuscous.

Medioventral process of pygophor turbinate, with the acute end apical; anal segment subcaudate, with the acute end basal, slightly longer than broad, anus in middle; genital styles long, narrow, slightly curved, apex rounded, a small obtuse-angular projection on ventral edge near base, a small, round projection on dorsal edge about middle.

Length, 4 millimeters; tegmen, 10.

Female.—Slightly fuscous over middle of pro- and mesonotum, otherwise similar to the male.

Pregenital sternite broader than long, hind margin obtuse-angularly produced from sides to middle; anal segment longer than broad, slightly narrowed to the apex, which is emarginate.

Length, 4 millimeters; tegmen, 10.

MINDANAO, Butuan (*Baker*), 1 female; Davao (*Baker*), 1 male.

Genus PROUTISTA Kirkaldy

Proutista moesta (Westwood).

Derbe (Phenice) moesta WESTWOOD, Ann. & Mag. Nat. Hist. (1851), II, 7, 209.

Proutista moesta KIRKALDY, Entomologist (1904), 279.

Common on sugar cane at Los Baños. This is a very common and widely distributed insect, but I have not been able to find the young.

Luzon, Manila (*Banks*); Mindoro, Mangarin (*Banks*). Bureau of Science Nos. 2256, 6499, 17022.

Proutista nigritarsis sp. nov.

Male.—Labium flattened and widened toward the apex. Light brown, clypeus and proboscis dark brown or black, carinae of thorax and legs lighter, apex of tibiae and third tarsal segment black, abdominal segments with darker marks along hind margin. Tegmina very similar to those of *P. moesta* (Westwood), but with markings browner and not so extensive, especially in the apical median cells.

Pygophor with ventral edge straight; anal segment long, narrow, subparallel-sided, apical third turned ventrad at a right angle to basal portion, apex rounded; genital styles long, narrow, subparallel-sided, slightly bent a little beyond middle, apex rounded and slightly swollen, forming a small knob; a small, thick spine arises from the dorsal edge near base.

Length, 2.7 millimeters; tegmen, 6.3.

Female.—Similar to the male in size and coloring. The small plates at the sides of the genital area larger than in *P. moesta* and considerably thickened.

MINDANAO, Zamboanga (*Baker*).

Genus NEOCAMMA Melichar

Neocamma trifasciata Melichar.

Neocamma trifasciata MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 435, Pl. 1, figs. 1-4.

I have not seen specimens of this genus, but according to Melichar's figures it differs from allied genera in having the clavus closed, the claval suture and claval vein extending to the hind margin; the subcosta and radius separate near base, but amalgamate again near apex; the neuration of the wing also differs. In coloration this species is similar to *Paraproutista trifasciata* Muir.

Genus **PARAPROUTISTA** Muir

Paraproudista trifasciata sp. nov. Plate I, fig. 2.

Male.—In coloration this appears to be similar to *Neocamma trifasciata* Melichar. Light brown or reddish yellow; clypeus and a small mark across pronotum darker; antennæ, legs, and anal segment lighter. Tegmina and wings as in *Neocamma trifasciata*.

Pygophor scarcely differentiated from abdominal segments, a small, pointed process in middle of ventral edge, no emargination around anal segment; anal segment short, subtubular, ventral edge at apex forming a point turned ventrad; genital styles short, broad, subcircular, depressed from middle to dorsal edge.

Female.—Genital area sunk below surface, elongate oval; anal segment in dorsal position, short and tubular, anus situated at end.

Length, 3 millimeters; tegmen, 7.5.

Luzon, Laguna, Los Baños (*Muir*), two cotypes in College of Agriculture, No. 18131.

Paraproudista luzonensis sp. nov.

Male.—This species is similar to *P. trifasciata*, but is redder in color, especially on abdomen; the three fuscous marks on tegmina are wider, especially on the costal border.

Anal segment as in *P. trifasciata*, but the apex broader and slightly emarginate, and the genital styles narrower and longer.

Length, 2.5 millimeters; tegmen, 7.

Luzon, Laguna, Mount Maquiling (*Baker*).

Paraproudista maculipennis (Banks).

Jada maculipennis BANKS, Phil. Journ. Sci., Sec. D (1910), 5, 39, Pl. 3, fig. 8.

The short club-shaped antennæ and the two cubital veins and six median sectors, the third of which is furcate, place this species in *Paraproudista*. The face in profile does not project conically, so it cannot be placed in *Jada*.

Male.—Ventral edge of pygophor obtuse-angularly produced from sides to middle, the sides of the process being slightly concave, the apex with a fine transverse suture; lateral edges acute-angularly produced at sides of anal segment, length of processes greater than width at base; anal segment longer than lateral processes, narrow, narrowing to the pointed apex, which is slightly curved ventrad; anus before middle; genital styles not so long as anal segment, rounded at apex, edges subparallel.

Paraproudista platypes sp. nov.

Male.—Hind tarsi laterally flattened. Dark fuscous brown; carinae of thorax and posterior angle of mesonotum lighter, legs light brown, tarsi and apex of hind tibiae fuscous. Tegmina fuscous brown with yellowish hyaline areas forming eight or nine irregular spots in costal cell, continuing into radial cell in middle and across subcostal cell near apex, lighter over the cubital veins and the cross veins of the first three median sectors; some irregular marks over apical half of third and fourth median sectors and an irregular triangular spot at apices of tegmina, veins dark; wings fuscous with dark veins.

Ventral edge of pygophor straight; anal segment subparallel-sided, length a little more than twice the width, anus in middle, slightly narrowed and rounded at apex; genital styles acutely angular, length about twice the width of base, outer surface convex, a small angular projection on ventral edge near base.

Length, 4.3 millimeters; tegmen, 11.5.

Female.—A transverse ridge across middle of pregenital segment, posterior edge slightly rounded. In size and color similar to male.

MINDANAO, Davao (*Baker*).

Paraproudista fuscipennis sp. nov.

Male.—Fuscous brown, carinae of head and thorax lighter, legs and proboscis yellowish. Tegmina dark fuscous, a series of about ten white spots on costa, small white spots on cross vein of cubitus and first three median sectors, a light spot at base of fourth and fifth median sectors, small white spots at apex of radius and media, which are otherwise dark, the subcosta and radius reddish.

Ventral edge of pygophor straight, lateral edges very slightly and roundly produced; anal segment with anus in middle, broad at base and narrowing rapidly, the portion distad of the anus forming a slender, sharp spine, slightly curved ventrad; genital styles triangular, subequilateral, a median carina from apex to base.

Length, 4 millimeters; tegmen, 9.5.

Female.—Similar to the male in size, but considerably lighter in color, the spots on costa more or less coalescing. Posterior edge of pregenital segment angularly produced from sides to middle.

MINDANAO, Davao (*Baker*).

Genus ACANTHOCERA Melichar

Acanthocera punctifrons Melichar. Plate I, fig. 3.

Acanthocera punctifrons MELICHAR, Phil. Journ. Sci., Ser. D (1914),
9, 436, Pl. I, figs. 5-8.

The Los Baños specimens that I identify as of this species agree in specific characters with Melichar's description of *Acanthocera punctifrons*, but differ generically. The subcosta reaches the costal margin near apex, a folding under of the costal membrane giving it the appearance of Melichar's figures; the first median sector is attached to the cubital system, but not so distinctly as in *Paraproutista*, the second free sector is furcate, the clavus is open; this is the same tegmen as that of *Paraproutista*.

In the female the genital styles (ovipositor and sheath) are abortive as in *Proutista*, *Paraproutista*, *Neocamma*, and the Sikaianini.

In the male the ventral edge of pygophor is straight; a triangular projection arising from the inner surface fits perfectly between the genital styles, lateral edges entire; anal segment longer than broad, anus in basal third, beyond anus the segment curves ventrad and narrows to the truncate apex; genital styles broader than long, broadest at apex, which is slightly sinuous, ventral margins fitting against angular projection from pygophor.

Genus SIKAIANA Distant

This and three allied genera form a small tribe of minute, delicate derbids closely allied to one another. Although they are rare in collections, yet they are abundant in their habitats; they most frequently rest upon the underside of leaves of various species of palms. In all the species with which I am acquainted, the anal area of the wing is large and is modified into a stridulating organ, the rest of the wing is small or minute. Whether these groups should be considered as genera or subgenera is a point on which homopterists may not all agree, but it is expedient to recognize the character upon which they are founded.

Sikaiana makii Muir.

Sikaiana makii MUIR, Proc. Hawaiian Ent. Soc. (1915), 3, 117.

One female agrees with the description of this species, but a male is required to make the identification definite.

Luzon, Laguna, Mount Maquiling (*Muir*), on palm trees.

Formerly only known from Formosa.

Sikaiana vitreiceps sp. nov.

Female.—White or light yellow, fuscous on antennæ and abdominal tergites. Tegmina hyaline, vitreous, veins yellow, costa reddish, three yellowish spots at end of costal cell with red dots on costa between them, a square black mark at end of subcostal cell and a lighter mark beyond it to media; wings reaching to about end of basal median cell, hyaline, veins yellow, costa excavate from a little before middle to apex.

Anal segment exceedingly short, anal style large, roundly cordate, concavo-convex, arising from beneath the apex of segment; genital styles small and complex.

Length, 1.3 millimeters; tegmen, 4.

Luzon, Laguna, Los Baños (Muir), on palm trees.

Genus MUIRIA Kirkaldy**Muiria iridescens sp. nov.**

First joint of antennæ as long as wide or a little longer, second joint as long as head and thorax, flattened, set at side about one fourth from apex, second joint of female not quite so long.

Flavous, fuscous on abdomen; tegmina hyaline, iridescent, veins yellow, apical half of costal and radial cells yellowish with small white dots, a black spot at apex of costal cell and a lighter one at apex of media, a few small red dots along apex of tegmen; white, waxy secretion along apical edge; wings minute, of the same shape as in *M. stridula* Kirkaldy.

Male.—Lateral edges of pygophor forming a small, angular projection on each side of anal segment; anal segment much longer than lateral projections, flattened horizontally, lateral margins subparallel to beyond middle then gradually converging to the pointed apex, curved downward from about the middle; genital styles reaching beyond lateral plates, much longer than wide, apex diagonally truncate.

Length, 1.5 millimeters; tegmen, 4.

Luzon, Laguna, Los Baños (Muir), on palm trees.

Genus LEOMELICHARIA Muir**Leomelicharia nigrovittata sp. nov.**

Fuscous red or reddish brown, posterior edge of mesonotum lighter, legs and abdominal sternites yellowish. Tegmina hyaline, all the apical third and a band down the costa including the costal, subcostal, and basal median cells, and slightly beyond at the bases of median sectors black; a small white dot at apex of submedian cell; veins reddish, especially the costa and

costal cross veins and the apical veins; wings minute, hardly reaching beyond apex of scutellum, triangular, reddish; stridulating area large.

Male.—Ventral edge of pygophor at middle with a small angular process; the edges of pygophor produced into a long process, narrowing to the bluntly rounded apex; anal segment not reaching to end of lateral processes, little longer than wide, narrowed toward apex; rounded; anus at apex and ventrad; anal style in lateral view larger than, and appearing as the distal portion of, the anal segment; styles not reaching to end of lateral processes, narrow, broadest at base, apices turned inward, lying within the pygophor; aedeagus large.

Female.—Pregenital sternite slightly angularly produced at middle; styles (ovipositor and sheath) abortive; on each side of the genital area a plate (lateral plate), with its ventral portion subcircular; a small process in the middle meets a corresponding process from the other side, the dorsal portion conical; the anal segment, which lies between the conical portions, is small, about as long as broad; anal styles rounded at apex and longer than anal segment.

Length, 1.80 millimeters; tegmen, 5.8.

Luzon, Laguna, Mount Maquiling (*Muir*), common on palm trees; type in College of Agriculture, No. 18127.

Leomelicharia delicata sp. nov.

Light brown, pronotum with a light mark on the middle; mesonotum darker on lateral angles; abdomen dorsally with four lines of lighter spots; legs, apex of abdomen, and abdominal sternites yellow. Tegmina hyaline, vitreous, slightly tinged with yellow, a fuscous mark along costal area covering costal and subcostal cells to apex, a series of yellow spots occupying most of costal cell from middle to apex, veins reddish, especially costa and apical veins; wings minute, triangular, fuscous, stridulating area large.

Male.—Ventral edge of pygophor not drawn out into a point, lateral projections acutely angular, apex pointed; anal segments shorter than lateral projections, constricted near apex; anal style large, arising from apex of segment on ventral side, in lateral view the segment and style appear as if composed of three pieces; genital styles not quite reaching to end of lateral processes, narrow, bluntly pointed at apex, broader and rounder at base.

Female.—Lateral plates on genital area much smaller than in *L. nigrovittata*, dorsal plates forming a small triangle, the ventral

plate narrow, more like a style with a rounded base; anal segment wider than long, apex rounded, anal style large, circular, arising from below apex of segment.

Length, 1.5 millimeters; tegmen, 4.

Luzon, Laguna, Mount Maquiling (Muir), on palm trees; cotypes in College of Agriculture, No. 18129.

Leomelicharia delicatissima sp. nov.

Light brown or yellowish, thorax darker with a light median mark and some lighter marks on sides, abdominal tergites darker with light dots; genitalia yellowish. Tegmina hyaline, vitreous, subcostal and radial veins black, in apical half the black extending into radial, subcostal, and costal cells; a series of light dots in costal cell to apex, other veins reddish; wings minute, hardly reaching to third abdominal segment, fuscous on borders; stridulating area large.

Female.—Pregenital sternite with a small angular projection on middle of posterior edge; genital area more like that of *L. nigrolineata* than that of *delicata*; upper lateral plates more obtusely angular.

Length, 1.5 millimeters; tegmen, 4.

Male.—Unknown.

Luzon, Laguna, Mount Maquiling (Muir), on palm trees.

In this species the basal median cell is not quite so long as, and is a little broader than, in the type species, thus approaching *Sikaiana*.

Leomelicharia pulchra sp. nov.

Light brown or yellowish, abdomen darker with lighter spots, anal area light. Tegmina hyaline, vitreous; costal, subcostal, and basal median cells black or fuscous to apex, the color also extending slightly along base of median sectors; veins red, especially the costa and costal cross veins, three white dots in apical cells; wings very minute, triangular, fuscous, stridulating area large.

Male.—Lateral edges of pygophor produced into angular plates with blunted apices; anal segment little longer than broad, anal style at apex on underside, about as long as segment; styles reaching to end of lateral processes, narrow, apex bluntly pointed.

Female.—Posterior edge of pregenital sternites drawn to a point in the middle; lateral plates very much like those of *L. nigrolineata*; anal style large and circular.

Length, 1.5 millimeters; tegmen, 4.

Luzon, Laguna, Mount Maquiling (Muir), on palm trees; cotype in College of Agriculture, No. 18128.

Genus *DISTANTINIA* novum

Differing from *Leomelicharia* in the neuration of the tegmina. The cubitus arises from the median vein about one fourth from base; thus there are only two longitudinal veins in basal portion of tegmen.

Distantinia nigrocaerulea sp. nov. Plate I, fig. 5.

Brown; carinae of vertex and pronotum, hind margin of mesonotum, edge of tegulae, legs, genitalia, and small spots on abdominal tergites lighter. Tegmina hyaline, apical fourth dark fuscous with four white spots, the dark color continuing on costal and subcostal cells to middle of tegmina, another dark mark at junction of clavus with media, and a smaller one at extreme base; hind margin excavate at apex of median sectors, making the margin sinuate; veins reddish, especially the costa and the transcostal and apical veins; wings minute, triangular, fuscous, lighter on hind margin; stridulating area large.

Male.—Lateral edges of pygophor drawn out into acute angles; anal segment a little longer than broad, apex rounded, anal style about as long as segment, arising from ventral part of apex of segment; genital styles not reaching to end of lateral processes, acutely angular, attached to pygophor by one corner of base, apex subacute.

Female.—Posterior edge of pregenital sternite produced as a subspatulate process, depressed along middle; lateral plates well developed, ventral plate circular, dorsal plate subangular with obtuse apex; between them lies a small bifurcated sclerite (belonging to basal plate?).

Length, 1.8 millimeters; tegmen, 5.

Luzon, Laguna, Mount Maquiling (Muir), on palm trees; cotype in College of Agriculture, No. 18130.

In general appearance this is very much like *Leomelicharia nigrovittata* Muir, but the white spots in the black apex of the tegmina constitute a well-marked character.

RHOTANINÆ

The subfamily Rhotaninæ, as now constituted, contains six genera (*Decora*, *Levu*, *Rhotana*, *Genestia*, *Sumangala*, and *Mecynorrhynchus*), but they are ill defined. There are still a few undescribed species before me, but I do not feel justified in naming them until I can define the genera more definitely.

Genus RHOTANA Walker

Rhotana punctovenosa Melichar.

Rhotana punctovenosa MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 437.

Rhotana excelsa Melichar.

Rhotana excelsa MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 437.

This species has the carinæ of vertex not touching, and on face they only just touch between eyes. The species has more of the characters of *Decora* than of *Rhotana*.

Rhotana basipunctulata Melichar.

Rhotana basipunctulata MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 438.

Genus LEVU Kirkaldy

In the species of the genus *Levu* the shoulder keels are distinct.

Levu lucida Muir.

Levu lucida MUIR, Proc. Hawaiian Ent. Soc. (1915), 3, 136.

Veins redder than in the type species and the white marks not so distinct. Male pygophor laterally compressed; ventral edge straight; lateral edges very slightly angular; anal segment a little longer than width at base, narrowing steeply from base to apex, which is narrowly truncate, anus at apex; lateral styles reaching beyond anal segment, subparallel-sided, ventral apical corner rounded, dorsal corner angular, a small rounded process on inner dorsal edge near the middle.

Luzon, Laguna, Los Baños (Muir).

Originally described from a female specimen from Java.

Levu irrorata sp. nov.

Male.—Congeneric with *L. lucida*, which differs from the type of the genus in having the costal cell very broad, especially the basal half where the costal border is arcuately produced. Yellow; head and pronotum lighter than mesonotum, two or three small fuscous marks from eye to facial keels, two dark marks at posterior edge of mesonotum; legs fuscous. Tegmina fuscous, darkest at base, lighter along apical and posterior margins, three median apical cells vitreous with a small fuscous mark at apex of each cell, a series of five black specks near apical margin from end of costa to cubitus, veins spotted with fuscous and white, apical veins and apical cross veins tinged with red. The

white portions of tegmina often incrusted with a white, waxy secretion, making them very conspicuous.

Pygophor laterally compressed, edges entire, anal segment small, gradually narrowed to rounded apex; anus at apex; styles gradually widening to the wide, truncate apex.

Female.—Caudal edge of pregenital sternite angularly produced from sides to middle.

Length, 2.7 millimeters; tegmen, 5.

MINDANAO, Iligan (*Baker*); LUZON, Laguna, Los Baños (*Muir*), on palm trees; Tayabas, Mount Banahao (*Baker*).

Genus DECORA Dammermann

Decora pavo Bierman.

Decora pavo BIERMAN, Notes Leyden Mus. (1910), 33, 20.

The original description is not available, but I believe this determination is correct.

MINDANAO, Lanao, Kolambungan (*Banks*), College of Agriculture No. 18107; LUZON, Laguna, Los Baños (*Muir*).

Genus MECYNORHYNCHUS Muir

Mecynorhynchus fuscus Muir.

LUZON, Laguna, Los Baños (*Baker*). Previously known from Java.

Mecynorhynchus hyalinus Melichar.

Mecynorhynchus hyalinus MELICHAR, Phil. Journ. Sci., Sec. D (1914), 9, 437.

As Melichar's use of the specific name *hyalinus* in this genus, for a Philippine species, antedates my use of it for a Javan species,* the latter may be known as *Mecynorhynchus nigropunctatus* new name.

Mecynorhynchus kershawi Muir.

Mecynorhynchus kershawi MUIR, Bull. Hawaiian Sugar Plant. Assoc., Div. Ent. (1913), 12, 82; Proc. Haw. Ent. Soc. (1913), 3, 133.

Previously known from Borneo. Now recorded from Los Baños.

* *Proc. Hawaiian Ent. Soc.* (1915), 12, 134.

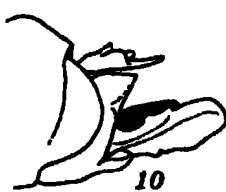
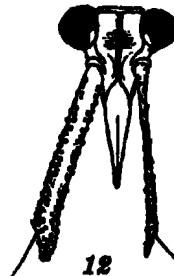
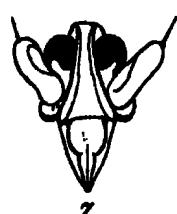
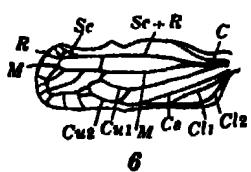
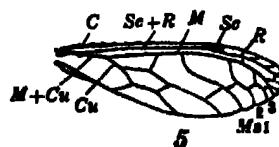
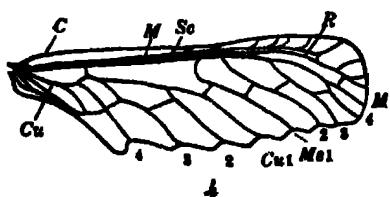
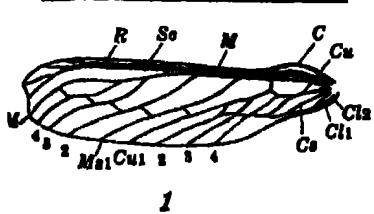
ILLUSTRATIONS

PLATE I

- FIG. 1.** *Peggia nitida* (Stål), tegmen, *C*, costa; *Sc*, subcosta; *R*, radius; *M*, media; *Cu*, cubitus; *Ms* 1, 2, 3, 4, median sectors; *Cu* 1, 2, 3, 4, cubital veins; *Cs*, claval suture; *Cl*, *Cl*, claval veins.
2. *Paraprontista trifasciata* sp. nov., tegmen.
3. *Aranthocera punctifrons* Melichar, tegmen.
4. *Lonbañosia bakeri* g. et sp. nov., tegmen. (Lettering the same as in fig. 1.)
5. *Distantinia nigrocacuminis* sp. nov., tegmen. (Lettering the same as in fig. 1.)
6. *Banksiella pulchra* g. et sp. nov., tegmen.
7. *Neolamenia flava* sp. nov., front view of head.
8. *Neodendrokara crescentiformis* sp. nov., head in profile.
9. *Neocyclokara flava* sp. nov., tegmen.
10. *Peggiopsis pseudoflavicornis* g. et sp. nov., lateral view of apex of abdomen.
11. *Peggiopsis flavicornis* (Melichar), lateral view of abdomen.
12. *Mindana latifrons* g. et sp. nov., front view of head (one antenna viewed flat, the other at edge).
13. *Peggiopsis pallida* sp. nov., lateral view of apex of abdomen.
14. *Zoraida sinuosa* Boheman⁷, lateral view of apex of abdomen.
15. *Banksiella pulchra* sp. nov., lateral view of head.
16. *Peggia irrorata* sp. nov., lateral view of apex of abdomen.
17. *Neocyclokara flava* sp. nov., lateral view of head.
18. *Zoraida melichari* sp. nov., lateral view of apex of abdomen

TEXT FIGURES

- FIG. 1.** *Kamendaka mindanensis* sp. nov., ♂edeagus.
2. *Kamendaka luzonensis* sp. nov., ♂edeagus.
3. *Kamendaka tayabasensis* sp. nov., ♂edeagus.
4. *Kamendaka maquilingensis* sp. nov., ♂edeagus.



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STUDIES IN PHILIPPINE DIPTERA, II

By M. BEZZI

(Turin, Italy)

ONE PLATE

Since the publication of the first paper of this series¹ I have received from Professor Baker very rich material, which enables me to continue these studies and to add some very important novelties to the already interesting oriental fly fauna. A second "century" is here offered, which will be quickly followed by others.

In the meantime some new species of Diptera have been described from the Islands, which are enumerated here with the object of completing the catalogue appended to the first century.

TIPULIDÆ

Geranomyia sornigera ALEXANDER, Insec. Menstr. (1913), 1, 137, from Pettit Barracks (Ludlow).

TACHINIDÆ

Bengalia, two unnamed species, BEZZI, Ent. Mitteil (1913), 2, 75 and 78, from Los Baños (Baker).

PHORIDÆ

Aphiochæta variata MALLOCH, Proc. U. S. Nat. Mus. (1912), 43, 515, from Manila (Stanton).

CYPSELIDÆ (BORBORIDÆ)

Leptocera (Limosina) picturata MALLOCH, Proc. U. S. Nat. Mus. (1912), 43, 658, from Manila (Brown).

¹ See This Journal, Sec. D (1913), 2, 305-332, for the first century.

ORTALIDÆ

Campylocera thoracalis HENDEL, Arch. f. Naturg. (1913), 79, 95, from Maaø, Negros (Banks).

MILICHIIDÆ

Gitonides perspicax KNAB, Insec. Menstr. (1914), 2, 166, reared from *Pseudococcus* sp., Manila (Compte).

SECOND CENTURY OF THE BAKER COLLECTION

The first century of Philippine Diptera was based upon specimens from Luzon only. More recently Professor Baker has collected in islands other than Luzon, and for this reason localities are given for each species of the second century. Another series of Diptera, chiefly blood-sucking forms, has been received from Mr. M. B. Mitzmain, Alabang, Rizal Province, Luzon. This locality is about 35 kilometers from Los Baños.

101. *Plecia fulvicollis* Fabr. 1805.

Los Baños. A very common species spread over all the Oriental Region and extending also to New Guinea and Australia. It is very variable in size, one female specimen measuring only 4 millimeters in length, like an Indian one recorded by Brunetti.¹

102. *Bibio rubicundus* van der Wulp. 1884.

Some females from Mount Banahao. Previously known only from Java. A very characteristic species, differing from *Bibio obediens* O. S. (New Guinea) in the yellow coloration of the wings; the antennal flagellum, wanting in van der Wulp's type, is black; on the contrary, the scape, which is said to be black, is yellow in the present specimens, as in *obediens*. The very long spur of the front tibiae—about as long as the tibia—is dark reddish. The wings have the stigma pale yellow and rather broad; the second posterior cell is sessile at base.

103. *Culicoides judicandus* sp. nov.

Female.—Length of body, 1 millimeter. Near *C. molestus* Skuse of Australia and *C. guttifer* de Meijere of Java, but the wing pubescence very scanty and confined to the extreme tip of the wings. In this character it agrees with *C. pungens* de Meijere of Java; but the wing pattern is more like that of *guttifer*, from which it differs chiefly in having a clear spot at end of the subcostal cell, and in the fact that the clear marginal

¹ Fauna of Brit. India, 163.

spots are not in contact with the wing margin, but are placed at a little distance from it; the other spots are distributed as in *guttifer*. Neuration the same as in *guttifer*. Body brownish black, without distinct pattern. Legs dark brown, with the knees and the tips of tibiae and tarsi whitish yellow. Antennæ short and blackish.

LUZON, Rizal, Alabang (*Mitzmain*). Mr. Mitzmain has used this gnat in experiments on the transmission of surra.

104. *Pselliophora suspirans* O. S. 1882.

Mount Maquiling. An endemic species. The present specimens differ from Osten Sacken's description in having a rounded yellowish spot between the middle and hind coxae, of which the author does not speak; the collar shows a grayish spot in the middle; the wings show a trace of a yellowish tinge at base.

Key to the Philippine species of the genus Pselliophora Osten Sacken.

The genus *Pselliophora* seems to be rich in endemic Philippine species, some of which are very beautiful insects and are similar in general facies and coloration to some endemic species of the genus *Erinocera*. They may be distinguished as follows:

- a'. Tibiae with a white basal ring
much broader at base than
- b'. Wings uniform black or blackish; head brown; thorax entirely black dolens O. S.
- b'. Wings brown, with a white spot in the middle.
 - c'. Scutellum black.
 - d'. Collar entirely black or with only a grayish middle spot; femora black at base; abdomen with a single yellow band.
suspirans O. S.
 - d'. Collar with a broad white spot in the middle; femora broadly yellow at base, at least those of the hind pair in the female; third and fourth abdominal segments with yellow spots.
suspirans hilaris var. nov.
 - c'. Scutellum yellow; femora with yellow base; abdomen with segments 2 to 4 reddish yellow; genitalia black. idalia O. S.
- a'. Tibiae without white basal rings; wings uniformly blackish, with the fourth posterior cell short, twice as broad at base as at end; species of greater size.
 - e'. Thorax and legs entirely black præfica sp. nov.
 - e'. Thorax and legs partly orange-yellow tripudians sp. nov.

105. *Pselliophora suspirans* hilaris var. nov.

Very like *P. suspirans*, but distinguished by the more whitish than yellowish thoracic markings and by the more extended, whitish abdominal pattern.

Male and female.—Length of body, 12 to 13 millimeters; of wing, 12 to 18. Rostrum without brown spot in front. Collar

with a broad whitish spot toward the middle. Pleuræ with a rounded whitish spot between the last two pairs of coxae. Scutellum black; mesophragma with a less distinct yellowish spot on each side. Halteres black, with the stalk yellowish toward the base. Abdomen with the pale crossband on the second segment as in *P. suspirans*, but besides with a broad yellowish band on the hind borders of third and fourth (in the male narrowly interrupted in the middle, in the female divided into two spots); also a smaller yellow spot on each side of fifth segment. On the venter all the segments after the second one with a broad yellow band at the hind border or a broad spot on each side; last segment in the male produced in the shape of a long, conical yellow protuberance. Male genitalia black and black-haired above, dark yellowish pilose below, with a yellow, longitudinal, middle stripe and two yellow tubercles at tip below. Ovipositor black, the terminal lamellæ dark yellow at tip. Hind femora in male narrowly, in female with the basal half, yellow. Wings as in *P. suspirans*; the triangular whitish spot at base of the two basal cells more developed; the first posterior cell usually stalked at base.

Luzon, Laguna, Los Baños and Paete (Baker).

106. *Pselliophora præfica* sp. nov.

An entirely black species, with unicolorous legs and wings.

Male.—Length of body, 15 millimeters; of wing, 16. Head black, but the underside of rostrum and a broad border at the hind margin of eyes reddish yellow; palpi black and black-haired; antennæ entirely black, with the appendices of flagellum provided with scanty dark pubescence. Thorax entirely black even on collar, scutellum, and mesophragma; dorsum rather opaque, pleuræ shining; the rather long hairs on postalar calli and scutellum black. Halteres black, with black pubescence on the stalk. Abdomen entirely black, even on center, with rather long black pubescence; genitalia entirely black and black-haired. Legs entirely black, even on the coxae, and black-pubescent, hind femora distinctly thickened.

Wings uniformly darkened, with strong metallic reflections; squamae black; basal pubescence of the axillary angle long, soft, and black. Veins black, but the basal vein of the discoidal cell appears whitish or somewhat light in color; first posterior cell sessile at base; fourth posterior cell short, much narrowed at end, more than twice as broad at base as at end.

MINDANAO, Butuan (Baker).

107. *Pselaphora tripudians* sp. nov.

Evidently allied to *P. præfica*, but distinguished by the bright rufous of head, thorax, and tibiae. This very strikingly colored species seems to be allied to *P. incunctans* Walker of Celebes, *velutina* van der Wulp of Celebes, and *annulosa* van der Wulp of Java, but is different from these and from any other in coloration.

Female.—Length of body, 18 millimeters; of wing, 19. Head, with neck and rostrum, entirely bright rufous, with reddish or yellowish hairs and some scattered, long black hairs on occiput only; palpi rufous, with only the extreme tip of last joint deep black. Antennæ entirely rufous and with reddish hairs, only the scape below with black hairs. Thorax with collar, prothorax, and entire dorsum bright opaque rufous, with reddish hairs; pleuræ, scutellum, and mesophragma deep black, with black hairs. Halteres black. Abdomen entirely deep black, opaque, even on venter, with few and short black hairs; ovipositor shining black, with acute dark reddish terminal lamellæ. Front coxae and trochanters rufous like the prothorax; front legs wanting in case of type; middle and hind legs with black coxae and trochanters; femora black and black-haired, but their ends rufous and with reddish hairs; tibiae rufous, reddish-haired, the extreme tips and terminal spurs black; tarsi black, but the pretarsi rufous at base. Wings exactly as in *P. præfica*.

LUZON, Laguna, Mount Maquiling (*Baker*).

The possibility is not excluded that the present species may be the female of *P. præfica*.

108. *Tipula umbrina* Wied. 1828.

A female of this species from Los Baños. It is known also from Sumatra, Java, Borneo, and New Guinea.

109. *Tipulodina cinctipes* de Meijere. 1911.

One female from Mount Maquiling, Luzon. This is a very distinct species on account of its vitreous wings and white-banded legs. It is perhaps the same as *Tipula pedata* of Osten Sacken's paper, but in the white ring of the front femora it answers better to the description of *T. cinctipes* from Borneo, known in the male sex only. The present specimen is larger, measuring 17 millimeters in length of body, 17 in length of wing, and 180 in spread of legs. The subcostal cell and a narrow streak along the fifth longitudinal vein are deep black; the fork formed by the first vein issuing from the discoidal cell is as long as its stalk, in contrast with de Meijere's description.

The genus *Tipulodina*, in my opinion, is to be placed in the subfamily Dolichopodinae, and to this genus must be added other species besides *T. pedata* Wiedemann, like *magnicornis* Enderlein, *venusta* Walker, *inordinans* Walker, *gracillima* Brunetti, and *patricia* Brunetti.

110. *Megistocera fuscata* Wied. 1821.

A couple of specimens from Mount Maquiling. This is a very interesting species, known from Java, Sumatra, Celebes, Aru, and Borneo. The antennæ of the male measure 65 millimeters in length, but they are in some cases more than 80. A very instructive figure of the characteristic wing of the present species has been published.*

111. *Scamboneura dotata* O. S. 1882.

A single female from Mount Maquiling. Endemic. This may be the unknown female of Osten Sacken's species, or a different species. It differs from the description of the male in the following points: Frons entirely yellow, without middle brown line; joints of the flagellum entirely blackish; thorax entirely yellow, opaque, without stripes; scutellum and mesophragma entirely yellow, the latter paler; pleuræ entirely pale yellowish. Abdomen yellowish, with a darker, median longitudinal stripe; ovipositor shining reddish, with the terminal lamellæ straight and obtuse at end.

In the Javanese species, *S. quadrata* de Meijere, 1913, of which only the female is known, the thorax has three longitudinal brown stripes; *S. vittifrons* Walker, 1861, from Amboina, also known only from the female, has an ochraceous unstriped thorax, with two black dots on each side; in addition, the head, antennæ, and abdomen are differently colored. At present I think it better to consider the present specimen as the other sex of *dotata*, or at most as a variety, which may be named *S. dotata unicolor* var. nov.

Key to the Philippine species of the genus Eriocera sens. lat.

The genus *Eriocera* seems to be very rich in endemic Philippine species; those known to me may be distinguished as follows:

a¹. Wings with only four posterior cells (*Eriocera* sens. str.).

b¹. Antennæ of male enormously elongate, many times as long as the body; wings subhyaline in both sexes, with the anterior and post-

- rior cross veins placed on the same line with the basal vein of the discoidal cell *verticalis* Wied.
- b'. Antennæ of male much shorter than the body; wings in both sexes infuscated with a whitish middle spot and with the above-named veins not in the same line.
- c'. Hind legs of the usual shape; abdomen dilated, shining, with violaceous reflections and with some yellowish bands near the base.
lativentris sp. nov.
- c'. Hind legs distinctly thickened; abdomen not dilated and entirely black *crassipes* sp. nov.
- e'. Wings with five posterior cells (genus *Physocronia* Big.).
d'. Legs black; abdomen with one or two yellow crossbands near the base; wings with black base and fore border. ... *mansueta* O. S.
d'. Legs yellow, with black knees; abdomen with four yellow crossbands; wings with yellowish base and fore border.
perennis O. S.

112. Eriocera verticalis Wiedemann. 1828.

A couple of specimens from Los Baños and Mount Maquiling. A very peculiar species, known from Java and Japan. The antennæ of the present male measure 45 millimeters in length.

113. Eriocera lativentris sp. nov.

Closely allied to *E. mansueta* Osten Sacken in coloration of body and wings, but at once distinguished by the abdomen being more than twice as broad and with the last four segments strongly shining and adorned with violaceous reflections.

Male.—Length of body, 11 to 13 millimeters; of wing, 10 to 12. Head covered with dense gray dust; antennæ with the two basal joints of flagellum more yellow. Thorax, scutellum, and halteres as in *E. mansueta*. Abdomen narrow at base, but becoming gradually broader, the sixth segment more than twice as broad as the second; abdomen clothed with black hairs; first joint entirely black; second yellow, with a black hind border; third black, with two narrow yellow crossbands at base; fourth black, with a similar band, but narrower; fifth to seventh entirely black, but with strong violaceous reflections. Genitalia yellow, with pale yellowish hairs. Venter black, with yellow crossbands on second, third, and fourth segments, that of second much broader than the others. Legs with the coxae entirely black, but the front femora distinctly yellowish near the base; hind legs not thicker than usual.

Wing pattern as in *E. mansueta*, but the base narrowly yellowish; first vein issuing from the distal cell not forked; posterior cross vein distinctly before the middle of the discoidal cell; auxiliary vein ending opposite the marginal cross vein.

Luzon, Laguna, Los Baños and Mount Maquiling (*Baker*).

114. *Eriocera crassipes* sp. nov.

Closely allied to *Eriocera lativentris*, but very distinct. *Male and female*.—Length of body (without ovipositor), 9 to 11 millimeters; of wing, 10 to 13; of ovipositor, about 5. Head dull black, with blackish dust. Antennæ entirely black. Thorax and scutellum opaque, not at all shining as in *E. lativentris*; pleuræ black-haired, with some gray dust above. Abdomen broader than in *E. mansueta*, but narrower than in *E. lativentris*, entirely black in both sexes; last five segments shining, but destitute of violaceous reflections. Venter entirely dull black; male genitalia opaque, orange-yellow, with yellowish hairs; ovipositor orange-yellow, opaque, its terminal lamellæ very thin and acute, longer than the basal joint. Legs entirely black, even at base of the front femora; hind femora, and especially the hind tibiæ on the apical half, distinctly incrassate; hind tarsi shorter and thicker. Wings as in *E. lativentris*, but subhyaline at base of hind border; the middle spot broader and more whitish than yellowish; first vein issuing from discal cell not forked; auxiliary vein ending before the marginal cross vein; posterior cross vein on, or a little after, the middle of the discoidal cell.

Luzon, Laguna, Los Baños and Mount Maquiling (*Baker*).

In the case of the male type the discoidal cell is regularly open in both wings, coalescing with the second posterior cell; in the female it is quite normal.

115. *Eriocera* (*Physecrania*) *mansueta* O. S. 1882.

Los Baños and Mount Maquiling. This endemic species is closely allied to *E. bicolor* Macquart and *E. cingulata* de Meijere. There is sometimes a smaller yellow crossband also on fore border of the third abdominal segment. The legs are black. An immature male specimen from Mount Limay, Bataan Province, Luzon, has the fourth posterior cell divided by a supernumerary cross vein regularly in both wings.

116. *Eriocera* (*Physecrania*) *perennis* O. S. 1882.

Los Baños and Mount Maquiling. Endemic.

117. *Conosia irrorata* Wied. 1828.

Specimens of both sexes from Los Baños and Mount Maquiling. This characteristic species is widely spread over the Oriental Region—New Guinea, Australia, and Japan—as well as over the whole Ethiopian Region.

118. *Mongoma pennipes* O. S. 1887.

One female from Los Baños. This delicate midge was first described from Borneo and was subsequently recorded from India, Ceylon, and Java.

119. *Trantepohlia pictipennis* sp. nov.

A pretty species, very near *T. speiseri* Edwards from Ceylon, but at once distinguished by the different wing pattern.

Male.—Length of body, 5 millimeters; of wing, 5.7. Head, palpi, and antennæ dark brownish, antennæ a little paler toward the base. Thorax on dorsum dark reddish brown, darker along the middle line; scutellum and mesophragma brownish; pleuræ blackish brown. Halteres pale yellowish, with darker stalk. Abdomen entirely black, even on venter, and a little shining; male genitalia small and black, terminating with two hooks curved upward. Coxæ entirely light yellowish, the tarsi darkened at end; front and middle femora without bristles at base beneath. Wings long and narrow, pale yellowish along the costa and hyaline, iridescent on the remainder; the brown markings are as figured by Edwards for *T. speiseri*⁴ with the following differences: The middle brown patch extended over the second longitudinal vein and from it a narrow fuscous border extending along the veins to the end of the anal cell; the brown apical patch not extended over the first posterior cell, which is hyaline in the middle, and has no clear spot in the middle of the second marginal cell.

Luzon, Laguna, Mount Maquiling (Raker).

120. *Styringomyia ceylonica* Edw. 1911.

Specimens of both sexes from Los Baños and Mount Maquiling. This strange insect is recorded from Ceylon, India, and Formosa; it is nearly allied to *S. didyma* Grimshaw from Hawaii and Java.

Key to the Philippine species of the genus Libnotes Westwood.

The genus *Libnotes* seems to be very rich in endemic species; those known from the Philippine Islands all have the marginal cross vein elongated, with the exception of *L. familiaris*, which is also found in Java; in this last island the opposite is the usual case. No species with punctate or variegated wings occurs in the Philippine Islands, so far as is known.

⁴ *Ann. & Mag. Nat. Hist.* (1913), VIII, 12, 204, fig. 2.

- a'. Marginal cross vein short, perpendicular, forming a right angle with the first longitudinal vein; base of second posterior cell more drawn inward than that of third; thorax ochraceous, with a middle, longitudinal black line; wings hyaline; legs yellowish..... *familiaris* O. S.
- a'. Marginal cross vein long, placed obliquely, seemingly the prolongation of the first longitudinal vein incurved toward the second.
- b'. Wings hyaline, with a more or less intensive yellowish tint; body entirely ochraceous, without black markings.
- c'. Wings with a very faint yellowish gray tint, only a little more infuscated at fore border and apex; bases of second and third posterior cells on the same line..... *opaca* sp. nov.
- c'. Wings with an intensive yellow tint and with a brown border around the apex; base of third posterior cell more drawn inward than that of second *marginalis* sp. nov.
- b'. Wings brown or blackish; body bright orange, with deep black markings; bases of second and third posterior cells on the same line; legs blackish.
- d'. Wings brown, with a distinctly darker apex; abdomen with only the tip black *termitina* O. S.
- d'. Wings uniformly blackish; abdomen almost entirely deep velvet-black *sempervirens* O. S.

121. *Libnotes opaca* sp. nov.

Entirely opaque orange-yellow, with the genitalia dark brown; wings hyaline, with a pale yellowish tint.

Male.—Length of body, 10.5 millimeters; of wing, 13. Head entirely yellow, with the rostrum brownish; palpi black; antennæ black, the scape and the first joint of flagellum somewhat yellowish. Thorax and scutellum uniform bright orange, entirely opaque, destitute of any black or brown marking. Halteres yellow, with brown knob. Abdomen colored like the thorax, even on venter; forceps brown, with the underplate dark yellow. Legs wanting in the type; coxae and trochanters bright orange.

Wings with only a light yellowish tinge, with an elongated, less distinct, stigmatic grayish spot and the extreme tip a little darkened. Marginal cross vein prolonged, seemingly a continuation of the first longitudinal vein; discoidal cell much narrower at base than at end, hind cross vein placed on its middle; second and third posterior cells of the same length.

Luzon, Laguna, Mount Maquiling (*Baker*).

The present species is closely allied to *L. familiaris* Osten Sacken, differing in the prolonged marginal cross vein and in the opaque, unstriped thorax. Allied also to *L. rufa* de Meijere, but distinguished by the wings not being infuscated and by the base of the third vein not being margined with fuscous.

122. *Libnotes marginalis* sp. nov.

Very near *L. opaca*, but of greater size and distinguished by the wings being yellowish and bordered with black at tips.

Male.—Length of body, 11.5 millimeters; of wing, 14.5. Head and rostrum yellow; palpi and antennæ as in *L. opaca*. Thorax, scutellum, halteres, and abdomen as in *L. opaca*. Genitalia with yellow, not brown, forceps. Legs wanting in the type. Wings with a strong yellowish tinge and a broad black border, extended from end of first vein to the base of fourth posterior cell; marginal cross vein elongated; discal cell a little shorter than in *L. opaca*; third posterior cell at base longer than the second, the veins, therefore, not on the same line as in *opaca* and exactly the opposite of the condition in *familiaris*.

LUZON, Laguna, Mount Maquiling (*Baker*).

123. *Libnotes termitina* O. S. 1882.

One male from Mount Maquiling. Endemic.

124. *Geranomyia argentifera* de Meij. 1911.

One female from Mount Maquiling. Know only from Java; very distinct species on account of the hyaline wings and the silvery patches on frons and thorax.

125. *Wallacea argentea* Dol. 1858.

Los Baños. A well-known species, widely distributed over the Oriental Region to New Guinea.

In case the generic name *Wallacea* Doleschall, 1858, is preoccupied by *Wallacea* Baly, 1858 (Coleoptera, Hispidæ), the name *Gabaza* Walker, 1859, must be employed in its place.

126. *Atherix limbata* O. S. 1882.

Mount Maquiling. The undescribed male of this endemic species is very much like the female; the eyes are united for a long distance; the antennæ and the proboscis are lighter yellow; the palpi are yellow and clothed with a shining white dust. The coloration of the abdomen is exactly the same as in the female; the entire last segment and the sides of the penultimate segment are reddish; genitalia erected, pale yellowish, whitish at end. Legs and wings as in the female.

127. *Atherix fascipennis* sp. nov.

The present species belongs to the oriental group of species distinguished by the body being wholly black, at least in the female, like *A. cincta* Brunetti, *A. lucens* de Meijere, *A. cæruleescens* Brunetti, but it is possible that some unknown males of these species have a partly yellow abdomen, as described by me for the Formosan specimens of *A. cincta*.¹ In the present species both sexes are completely black.

Male and female.—Length of body, 10 millimeters in the male and 11 to 12 in the female; of wing, 8 in the male and 9.5 to 10.5 in the female. Head black, with gray dust on the occiput; eyes of the male united for a line shorter than in *A. limbata*; the frons in the male white-dusted above the antennæ and deep black on fore half, in the female narrow, gray-dusted at vertex to the ocelli, deep black on middle, white-dusted above the antennæ. Face white-dusted in both sexes, with the middle bulla more developed and more prominent in the female than in the male. Antennæ entirely black, with long, thin black arista; palpi black, white-dusted and black-haired; proboscis wholly black. Hairs of the head black on frons and vertex, white on the occiput and below.

Thorax entirely black, even on the humeral calli, in the male more intensively black and more shining than in female; pleuræ clothed with shining gray dust and with whitish hairs; the hairs on the dorsum entirely black in the male, whitish on the hind half in female; above the humeri there is inward a narrow velvety black patch, more distinct in female than in male; metapleuræ with thin and soft white hairs. Scutellum black, in the male shining and black-haired, in the female gray-dusted and whitish-haired. Mesophragma black, gray-dusted on the sides. Halteres black, their stalks yellow at base.

Abdomen in both sexes entirely black, shining, even on venter; the first two segments in the female gray-dusted, in both sexes the two last segments with a broad triangular spot of white dust on the upper side; abdominal hairs mainly whitish. Male genitalia black and black-haired. Legs with the coxae black; middle tibiae dark yellowish; four posterior femora with a yellow ring at end, which is narrow and less distinct in the male, broader in the female.

Wings of the male with the basal half faintly yellowish hyaline, the apical half infuscated, more intensively infuscated toward the middle and thus forming a dark crossband below the stigma, which goes below the discoidal cell, the inner angle of the second submarginal being hyaline. In the female the wings are hyaline on the basal half, being only yellowish along the costal cell, and brown on the apical half; from the hyaline inner angle of the second submarginal cell begins a hyaline band which ends in the fourth posterior cell and, therefore, divides the dark part into two bands, united above and below; in the first basal cell there is a dark band before the root of the third longitudinal vein. Stigma brownish in both sexes. Venation as in *Atherix limbata*,

but the cubital fork is distinctly longer and provided with a shorter stalk.

Meszon, Laguna, Los Baños and Mount Maquiling; Tayabas, Malinao (Baker).

Genus SCHIZELLA novum

This new genus of the family Rhagionidae (Leptididae) is erected for a small fly that shows the general appearance of a *Chrysopilus*, differing in the form of the proboscis and chiefly in the extraordinary development of the third antennal joint; the latter character is noticeable because of the usual smallness of the antennæ in *Chrysopilus*. This elongated third joint is divided into two branches, forming a fork, a thing not rare in the family Tabanidae, but never observed in the Rhagionidae. The terminal style, which is long in *Chrysopilus*, is rudimentary in the new genus.

The principal characters of the new genus are as follows: Head as in *Chrysopilus*, but distinctly more transverse, facial bulla greatly developed and produced below, palpi small; proboscis with the terminal flaps much dilated, forming a sort of blister as great as the facial one, minutely transversely rugulose. Antennæ with the two basal joints small and short; third joint enormously developed, longer than the breadth of head, and divided into two branches from the root; the upper branch is a little shorter, but not narrower than the inferior one, which bears at its end a short, almost rudimentary style (Plate I, fig. 1). Eyes of the female without a trace of division; male unknown. Thorax, abdomen, and legs as in *Chrysopilus*; hind tibiae with a single spur at end, the external one. Wings with the venation exactly as in *Chrysopilus*; anal cell closed and provided with a short stalk.

Type, *Schizella furcicornis* sp. nov.

128. *Schizella furcicornis* sp. nov. Plate I, fig. 1.

A small dark reddish and brown species with pale legs and grayish wings, which are a little spotted toward the middle.

Female.—Length of body, 5 millimeters; of wing, 4.7; of antennæ, 1.2. Head black, gray-dusted on the occiput and on the sides of the frons; facial bulla pale yellowish, white-dusted; palpi blackish; proboscis with whitish flaps; antennæ with the two basal joints yellowish, the third brownish. Thorax dark reddish brown, the pleurae paler and clothed with whitish dust; it is entirely bare, even on metapleura, but it seems that on the hind part there is a short pubescence, with metallic reflections.

Scutellum brownish. Halteres pale yellowish. Abdomen blackish, rather shining, unicolorous, with short and few black hairs. Coxæ and femora pale yellowish; tibieæ and tarsi pale brownish.

Wings grayish hyaline, iridescent, with brown veins; stigma of greater size, dark brown, filling up completely the end of the marginal cell. Below the stigma a short dark band, ending on base of the cubital fork; below this band a small dark spot at end of the discoidal cell; besides, the apex of wings is broadly but faintly infuscated. Cubital fork very long and narrow, gradually broadened toward the end, its upper branch being bent at right angles at base and there provided with a short stump. Second posterior cell acute at base, narrow, and short, not broader and distinctly shorter than the third posterior cell; anterior cross vein short, placed near the base of the discoidal cell.

Luzon, Laguna, Mount Maquiling (*Baker*), one female.

129. *Chrysopilus lactuosus* Brun. 1909.

Male specimens from Mount Maquiling. They agree with the specimens from Formosa, referred by me^{*} to the present species, described from Assam.

Of the typical endemic species *Chrysopilus correctus*, recorded in the first century as No. 12, there are also specimens from Malinao, Tayabas, and from Butuan, Mindanao. The wing pattern seems to be variable in shape, remaining, however, of the same type; in the Butuan specimens the wings have a yellow tint, which is less developed in other specimens. In the undescribed male the thorax and the scutellum are clothed with shining metallic tomentum. The eyes are united, but there is no distinct differentiation between upper and lower areolets, a character somewhat aberrant in *Chrysopilus*.

130. *Chrysopilus diplostigma* sp. nov.

A small black species, distinguished by the peculiar abdominal pattern and by the enlarged stigmatic spot of the wings.

Male.—Length of body, 5 millimeters; of wing, 5. Head black, dark gray-dusted on occiput and face; eyes bisected, united on a long line; ocellar tubercle very prominent, bare; antennæ short, entirely black, with long, rather thick style; facial bulla shining black, ovate, gray on the sides; proboscis and palpi black, the latter black-haired. Thorax velvety black, rather shining, gray-dusted on sides and on the pleuræ; a trace

* *Ann. Mus. Nat. Hung.* (1912), 10, 449.

of golden tomentum on dorsum; thorax entirely bare, with some black hairs on the metapleura. Scutellum like the thorax; mesophragma black; gray-dusted, with black hairs on the sides; halteres black, the stalk yellowish at the base. Abdomen black and black-haired; strongly shining, even on venter; the tergites have at base a broad velvety black band, which on the terminal segments is reduced to a middle spot; genitalia black and black-haired. Coxæ black, with black hairs; femora black, with narrowly yellow tips, and the four posterior ones with yellow bases, broadest on the hind pair; tibiae and tarsi long and dark yellowish; terminal spurs yellow.

Wings grayish hyaline, with a faint yellowish tinge; stigmatic spot broad, elongate, dark brown, filling up the entire end of the marginal cell; in addition, and in contact with the stigma, the end of the subcostal cell is dark brown, beginning at the end of the auxiliary vein. The rest of the wing immaculate. Cubital fork only a little longer than its stalk, destitute of appendix at base; second posterior cell acute at base and longer than the third; the last shorter than the discoidal cell. Squamae pellucid brown, with pale fringe.

Luzon, Laguna, Los Baños (Baker).

181. *Mydas fruhstorferi* van der Wulp. 1896.

Mount Maquiling. Two female specimens, which answer perfectly to the description of the species from Java. Species of the present genus seem to be very scarce in the Oriental Region, only two others being known: namely, one from India (*ruficornis* Wiedemann) and one from Celebes and Sumatra (*basifascia* Walker); but I have in my collection a species from Ceylon that differs from all the others in being entirely black with the last three abdominal segments wholly rufous.

182. *Leptogaster princeps* O. S. 1882.

Specimens from Mount Banahao. A very distinct, endemic species, which may be considered as gigantic in its genus.

183. *Saropogon rubricosus* sp. nov.

Very near *S. jucundus* van der Wulp, 1872 (*vertebratus* Bigot, 1878), from Java and Sumatra, but distinguished by the wholly rufous abdomen and hind legs. The apical spur of the front tibiae is very small and easily overlooked; thus van der Wulp has described this species as belonging to *Habropogon*, and Bigot placed it in *Scylaticus*, a fact recently noted by de Meijere, who has described another allied species from Java.

Female.—Length of body, 11 millimeters; of wing, 10. Head black, with pale reddish face; the occiput clothed with dense whitish dust near the eyes; frons shining on the middle and white at the eye borders; face clothed with dense whitish dust with a yellowish sheen. Antennæ entirely black, the first two joints with black hairs, the third linear, longer than the first two together. Mystax formed by only four pale yellowish bristles; proboscis and palpi black, the latter with yellowish hairs, ocellar bristles black. Thorax and scutellum entirely shining reddish, only the humeral calli with a broad shining black spot; collar with yellowish bristles and a brown spot on each side; macrochaetae black, those of the dorsocentral rows rather long and much produced over the suture; pleurae with scanty yellowish tomentum; metapleura with yellow bristles. Scutellum with two strong black apical macrochaetae; mesophragma reddish, gray-dusted. Halteres yellowish.

Abdomen cylindric, of the same color as the thorax, shining above, opaque on venter, destitute of any dark marking, its hairs entirely pale; spines of the ovipositor red. Legs with the coxae entirely reddish, only a small ring on the trochanters and on the knees being black; their hairs and bristles entirely reddish; hind femora with a single long bristle below near the base. Terminal spur of front tibiae black, small, curved, distinct only at the outer side; claws black, with narrowly red base; pulvilli yellow.

Wings hyaline, with a faint yellowish tinge; veins brown; fourth posterior cell widely open at end; anterior cross vein on the first third of the discoidal cell; second longitudinal vein perfectly straight at end.

Luzon, Tayabas, Mount Banahao (Baker).

134. *Saropogon specularis* sp. nov.

A pretty, variegated species of small size, distinguished by the glistening, specular sternopleura. This cannot be the male of *S. rubricosus*, as is shown by the different mystax, different spur of front tibiae, and more numerous spines of the hind femora.

Male.—Length of body, 9 to 10 millimeters; of wing, 8.5 to 9. Head entirely black, clothed with gray dust on the face, on the sides of the frons, and on the occiput; ocellar and occipital bristles black; antennæ entirely black, the two basal joints with black bristles, the third joint linear, almost twice as long as the first two together. Mystax formed by eight or nine yellowish

bristles, disposed in a single row at the mouth border; palpi black and black-haired; proboscis black.

Thorax black, with the humeral calli narrowly reddish; on the collar and on the dorsum clothed by dense dark ochraceous tomentum, without defined pattern; on the pleuræ the tomentum scantier and light gray, only the sternopleura being glabrous and shining black; bristles of the collar black; thoracic macrochaetæ black, one praesutural, one anterior supra-alar, one posterior supra-alar, the dorsocentrals disposed on a line much produced forward, but shorter than in *S. rubricosus*. Metapleural bristles yellowish. Scutellum shining black, gray-dusted above, yellowish along the hind border, with a pair of strong black apical macrochaetæ. Mesophragma black, densely gray-dusted. Halteres brownish yellow.

Abdomen distinctly spatulate, shining, with very short, dark and pale hairs; first segment black, with a narrow yellowish hind border and a strong black bristle on each side; second segment yellow, with a broad black basal band, the last produced behind on the sides; third segment yellow, with a triangular black spot at base on each side, sometimes less distinct; fourth to seventh segments black, with a yellow hind border, which becomes gradually broader on the last segments; genitalia black, with whitish pubescence; venter black, the second and third segments almost entirely yellow, with rather long, pale yellowish hairs. Coxæ shining yellowish, the posterior four with a broad black spot outside and the front pair with long whitish hairs; all the trochanters reddish yellow; all the femora black, strongly shining, with reddish tips, with some pale hairs, and those of the hind pair with four or five strong black bristles at end below and before; tibiae yellowish, with long black bristles; spur of the front tibiae black, stronger than in *S. rubricosus*, and not curved outward; tarsi dark reddish, with black ends; claws black, with red bases; pulvilli yellow.

Wings grayish hyaline, iridescent, with black veins; fourth posterior cell at end as broad as the second; discoidal cell narrow, the anterior cross vein placed near its middle; anal cell very narrow at end; second longitudinal vein distinctly bent forward at end.

Luzon, Laguna, Mount Banahao. Mindanao, Butuan (Baker).

185. *Damalina semperi* O. S. 1882.

Mount Banahao. A very peculiar, endemic insect.

136. *Xenomyza vitripennis* O. S. 1882.

Numerous specimens of both sexes from Baguio, Benguet, and from Mount Maquiling, Laguna. The species seems to be very variable in the color of the legs, which varies from entirely black to entirely red or yellowish to variations of these colors. It was recently recorded also from Formosa, and the specimens from there were also very variable.

As the type of the genus *Damalis* was established by Westwood to be the South American species *D. curvipes* Fabricius, the name *Xenomyza* Wiedemann¹ must be used for the oriental species.

137. *Epholchiolaphria vulcanus* Wied. 1828.

Butuan, Mindanao. This species is widely spread over the Malay Archipelago and is recorded also from Formosa. It is notable that in these Philippine specimens the bristles of the mystax are all yellow, instead of black, as they were originally described by Wiedemann. I refer them provisionally to the present species because of the great variability attributed to it.²

138. *Epholchiolaphria leucoprocta* Wied. 1828.

Los Baños and Mount Maquiling, Luzon. Even in these specimens the mystax is yellow instead of black. The present species is considered by Hermann to be only a form of *E. vulcanus*. But these Philippine specimens are well distinguished by the scutellum and the two basal abdominal segments being clothed with argenteous hairs, which in the female are of a golden color; on the second segment these hairs are present only at sides and at hind border.

139. *Epholchiolaphria partialis* nom. nov. (*partita* Walker, 1860, not of same author, 1857, Borneo).

Numerous specimens from Mount Maquiling, Laguna, and Malinao, Tayabas, Luzon, and from Cagayan, Mindanao. Described from Celebes, but recorded from the Philippines by Osten Sacken. It is very closely allied to *Laphria dimidiata* Macquart, No. 13 of the first century, which belongs also to *Epholchiolaphria* Hermann, and of which there are also numerous other specimens from Mount Maquiling, Laguna, and Malinao, Tayabas, Luzon; and from Dapitan and Butuan, Mindanao.

¹ See Coquillett, *Proc. U. S. Nat. Mus.* (1910), 37, 530.

² See Hermann, *Entom. Mitteil.* (1914), 3, 107.

140. *Ephelochiaphria aurifacies* Macq. 1848.

Los Baños. Widely spread over the Malay Archipelago and usually referred to the genus *Maira*. These specimens answer also to the description of *azurea* Hermann, 1914, from Formosa.

141. *Smeringolaphria alternans* Wied. 1828.

Dapitan, Mindanao. Widely spread over the Oriental Region and recorded also from Formosa.

142. *Anisosis phalaris* O. S. 1882.

Mount Maquiling, Luzon. A very characteristic, endemic species. The name *Anisosis* Hermann, 1914, is preoccupied by *Anisosis* Deyrolle, 1857, in the Coleoptera.

143. *Orthogenis scapularis* Wied. 1828.

Mount Maquiling, Luzon. Widely spread over the Asiatic Archipelago to New Guinea.

144. *Pogonosoma cyanogaster* sp. nov.

This new species is closely allied to *P. bleekeri* Doleschall from Amboina and to *P. semifuscum* van der Wulp from Batjan, but is at once distinguished by the cyaneous white-pubescent abdomen. The recently described *funebre* Hermann from Formosa is also largely black and has black pubescence on the abdomen.

Female.—Length of body, 14 millimeters; of wing, 14. Head black, gray-dusted; ocellar tubercle shining black, with two long black bristles; occiput above with some black bristles, below with white hairs, which pass to the long white beard. Antennæ entirely black, the first two joints with long bristles, the third joint oval, as long as the first two together. Face with a very prominent, oval, shining black tubercle, which bears a mystax formed by from ten to twelve long black bristles; the remaining hairs of the face black below the base of the antennæ and white on the sides beneath. Palpi black, with short black hairs; proboscis black, very stout, of the characteristic shape for the genus, with long white hairs at the underside of the basal bulb and with short yellow pubescence at the end.

Thorax black, rather opaque, with faint metallic reflections and scanty whitish dust, without distinct stripes; bristles black; hairs black, but white on the sides and behind; collar gray-dusted, with numerous black bristles; pleurae white-haired and white-dusted; a strong black bristle on the upper hind corner of mesopleura; metapleural tuft formed by white bristles. Scutellum like the thorax, but more metallic and with black bristles

at hind border; mesophragma black, gray-dusted. Halteres with blackish stalk and yellowish knob.

Abdomen entirely shining ceruleous, with short white pubescence; the hind lateral corners of segments two to five bear short, spotlike stripes of whitish tomentum; all the segments have on the sides rather long white hairs and two or three strong black middle bristles. Venter wholly shining ceruleous, whitish-dusted and white-haired at base, black-haired at end. Ovipositor with the first segment dark ceruleous and with long black bristly hairs at end, the second segment black with pale yellowish hairs. Legs shining, dark ceruleous, with long white hairs and with black bristles; coxae black, densely gray-dusted; hind femora thickened, with a single, very strong black bristle beyond middle on outer side; middle femora with a long bristle before end on inner side; claws black, pulvilli dark yellowish.

Wings hyaline from base to middle, fuscous on the apical half, the inner border of colored area running from the fore margin of wing in front of the anterior cross vein to the hind margin at end of fourth posterior cell; the centers of the cells around the apex and the hind margin lighter. Discoidal cell shorter and narrower than the second posterior cell, the anterior cross vein situated on its first third; first posterior cell very long and narrow and rather narrowed at end; cross vein at end of the fourth posterior cell short and parallel with the posterior cross vein; stalk of the anal cell shorter than that of the fourth posterior cell. Veins black.

LUZON, Tayabas, Mount Banahao (*Baker*).

145. *Promachus forcipatus* Schin. 1868.

Los Baños and Mount Maquiling, Laguna, and Baguio, Benguet. A common endemic species, very characteristic by the extraordinary shape of the male genitalia.

146. *Promachus bifasciatus* Macq. 1838.

One female specimen from Cagayan, Mindanao. Known from Celebes and Java and new for the Philippines, but it is probably the species of which Osten Sacken says: "Resembles *bifasciatus* Macq., but is certainly different." The present specimen belongs surely to this species so far as can be judged from females only.

147. *Systropus*⁸ *valdezi* sp. nov.

One female specimen from Baguio, Benguet. Named in honor of Julian Valdez y Hernandez, Professor Baker's Cuban collector.

⁸This generic name was misprinted in the first century, *This Journal*, Sec. D (1913), 8, 313.

Nearly allied to the species that in the first century, No. 17, I assumed to be *S. sphecooides* Walker, but differing in the pattern of thorax, which shows four yellow spots at the four angles of the dorsum, and in the legs being much more yellow.

Female.—Length of body, 16 millimeters; of wing, 13. Occiput black, gray-dusted; ocellar tubercle dark reddish; eyes less produced above, united for a distance as long as the frontal triangle; the latter blackish, white-dusted on middle, yellow below on the antennal tubercle; face pale yellow, with whitish hairs; jowls whitish with shining white dust and with hairs; mentum yellow, with long whitish beard. Antennæ black, the first joint narrowly yellow at base, with blackish hairs, more than three times as long as the second; third joint wanting in the type. Palpi yellowish; proboscis black, but reddish below on the apical half.

Thorax black, opaque, finely punctulate, with three less distinct, broad, longitudinal grayish stripes; humeral calli yellow, and above them a broad yellow stripe, which is produced inward, reaching almost the middle line of dorsum; on the postalar calli there is a broad, triangular yellow spot; pleuræ black, gray-dusted, with a yellow stripe from the humeri to the front coxæ. Metasternum black, with transverse furrows and long and dense pale yellowish pubescence. Scutellum like the thorax, with whitish pubescence at hind border; mesophragma black, with the usual yellow tubercles on each side. Halteres yellowish, with the knob black above. Abdomen provided with a long stalk, which is formed by the first three segments and besides by the basal part of fourth; it is entirely black, opaque, the four basal segments being dark yellow at sides and below. Front legs entirely yellow, but their coxæ black, like those of the other pairs; middle legs with black femora, which have yellow ends, and with yellow tibieæ and tarsi; hind legs with the femora black above, reddish below, and yellow at ends with the tibieæ yellow, but adorned with a broad black middle ring; prætarsus yellow, with black end, the other joints black; tibial spines 8, 6, 6. Wings uniformly but faintly infuscated, a little more intensively at base and fore border; veins black.

Luzon, Mountain Province, Baguio (*Baker*).

Note.—The species believed to be *S. sphecooides*, of which there are also specimens from Mount Banahao, differs from *S. valdezi* only in the following points: The eyes are more produced above and are united for a line longer than the frontal triangle; the head, therefore, seems to be more acute above, viewed from before. The yellow stripes in front of the dorsum and the spots on

the postalar calli are entirely wanting or only indicated by a dark yellowish, less distinct trace; the metasternum is distinctly bluish, more furrowed, and less pubescent. The front legs have the femora more broadly blackish toward the base; the hind tibiae are black, with narrowly reddish base and yellow tip; the hind tarsi are entirely black, the pretarsi being only narrowly yellow at base. The infuscation of the wings is more intensive.

148. *Toxophora vilpa* Walk. 1849.

One female specimen from Mount Maquiling. Described from China and not recorded subsequently; nearly allied to *T. javana* Wiedemann from Java, but it seems to be distinguished by the golden, not whitish, abdominal stripes and by the complete transverse band of the same color on the last abdominal segment.

149. *Petrorossia fulvula* Wied. 1821.

Numerous specimens of both sexes from Mount Maquiling and Malinao, Luzon, and Dapitan, Mindanao. Widely spread over the Oriental Region and known to me also from Formosa. The species was originally described as an *Anthrax* and was subsequently placed in *Argyramæba* by de Meijere, but it belongs without doubt to the present genus, being closely allied to the Ethiopian species *fulvipes* Loew and *gratiosa* Bezzi.

150. *Exoprosopa pennipes* Wied. 1821.

Los Baños. A characteristic species, widely spread over the Oriental Region, but not yet recorded from the Philippines.

151. *Melanostomus orientale* Wied. 1824.

Baguio, Benguet. This species, as redescribed by de Meijere, seems to be the oriental representative of the common *M. mellinum* Linnaeus, and I am not sure if it may be considered as specifically distinct.

152. *Asarcina eurytaeniata* Bezzi. 1908.

Mount Maquiling. These specimens are the same as my type from Malacca. *Syrphus striatus* of Osten Sacken's paper, page 115, and therefore *Asarcus consequens* of my enumeration in the first century, are almost certainly the same as the present species.

153. *Axona chalcopyga* Wied. 1830.

Dapitan, Mindanao. An immature specimen, in which the beautiful blue coloration of the mature insect is not yet developed. This is a very characteristic species, more like a *Volucella* than

an *Eristalis*; it is widely spread over the Malay Archipelago and was originally described from Manila, but subsequently has not been recorded from the Philippines.

154. *Milesia reinwardtii* Wied. 1824.

Baguio, Benguet. Known from Java, Malacca, and Borneo, but new for the Philippine Islands.

155. *Milesia conspicienda* Walk. 1860.

Butuan, Mindanao. The species already recorded from the Philippine Islands with doubt by Osten Sacken is without doubt the present species, which was described from Celebes.

156. *Milesia bigoti* O. S. 1882.

Los Baños and Mount Maquiling. An endemic species, very different from the last two and belonging to another group.

157. *Tricholyza sorbillans* Wied. 1830.

Mount Maquiling, Luzon; bred by Professor Baker from a cocoon of *Attacus atlas*. It is interesting to find this species living also in the Philippines, in as much as it is widely spread over the Palaearctic, Ethiopian, and Oriental Regions. The species has received various names and has been bred from different Lepidoptera, being also known as a parasite of the silkworm.

158. *Sarcophaga ruficornis* Fabr. 1794.

LUZON, Rizal, Alabang (*Mitzmain*). The same as Indian specimens of this species in my collection, but I have not studied the male genitalia. This is a species of economic importance, which is known to produce severe forms of myiasis in India.

159. *Rhinia testacea* R. D. 1830.

LUZON, Rizal, Alabang (*Mitzmain*). Corresponding perfectly with Ethiopian specimens in my collection; known in the Oriental Region from the Nicobar and Key Islands.

160. *Thelycheta viridiaurea* Wied. 1824.

LUZON, Laguna, Los Baños and Mount Maquiling (*Baker*); Rizal, Alabang (*Mitzmain*). A beautiful species, originally described from India, which seems to be spread over the entire Oriental Region. New for the Philippines.

161. *Compsomyia dux* Esch. 1822.

LUZON, Laguna, Los Baños and Mount Maquiling; Benguet, Baguio (*Baker*); Rizal, Alabang (*Mitzmain*). Common in the

Orient. Originally described as a *Musca* and subsequently referred to *Lucilla*, or to *Chrysomyia*, or to *Pycnosoma*; but as Coquillett states that this species is the type of *Compsomyia*,¹⁰ it seems at present better to reserve this generic name for the species with enlarged areolets near the eyes of the male. They are prevalently oriental. The Ethiopian species of the group *marginalis* can retain the name *Pycnosoma*, and the Neotropical species of the group *macellaria* can retain that of *Chrysomyia*.

162. Philematomyia crassirostris Stein. 1903.

LUZON, Laguna, Mount Maquiling (*Baker*); Rizal, Alabang (*Mitzmain*). A common species, known from India and Java, but certainly spread over all the Oriental Region as well as the Mediterranean and Ethiopian Regions.

163. Philematomyia inferior Stein. 1909.

LEYTE, Tacloban (*Baker*); LUZON, Rizal, Alabang (*Mitzmain*). This species was described from Java; it seems to be widely spread in the Orient, like the preceding. It was first described in the genus *Musca*; but according to Patton and Cragg,¹¹ who have redescribed it under the name *gurnei*, it belongs to the present genus, notwithstanding the form of the proboscis, which on macroscopic examination seems to be very different from that of the type species.

164. Stomoxys nigra Macq. 1851.

Los Baños. This common Ethiopian blood-sucking fly seems to be widely spread in the Oriental Region, being recorded by Summers as one of the commoner species at Kuala Lumpur, Federated Malay States.

165. Lyperosia exigua de Meij. 1903.

LUZON, Laguna, Los Baños (*Baker*); Rizal, Alabang (*Mitzmain*). A common blood-sucking fly of the Orient.

166. Mydeea duplicata Meig. 1826.

Numerous specimens of both sexes from Baguio, Benguet. The only difference from the European specimens, that I can perceive, is that the female is darker and has darker legs and a little broader frons. The present species is not to be confounded with *M. duplex* Stein from New Guinea, which has only posterior dorsocentral bristles.

¹⁰ However, Brauer and Bergenstamm claimed, before the time of Coquillett, that the type of *Compsomyia* was *macellaria*.

¹¹ *Ind. Journ. Med. Res.* (1913), 1, 3.

167. *Orchisia costata* Meig. 1826.

Specimens of both sexes from Mount Maquiling, Laguna, and from Baguio, Benguet. This species is rare in central Europe, more common in southern Europe, and was described as *Caenobia marginata* by Wiedemann from southern China. It was not without emotion that I found in Professor Baker's collection specimens of this pretty fly, identical with those which I find here in the alpine valley of Susa, near Turin, on swampy places, over *Mentha* and other aromatic herbage.

It is interesting to note that at Baguio, Benguet, are to be found three European flies: namely, *Melanostoma mellinum (orientale)*, *Mydæa duplicata*, and *Orchisia costata*.

168. *Amphicyphus reticulatus* Dol. 1856.

Mount Maquiling. Identical with specimens from Calcutta, India, in my collection; described from Borneo as an *Enaima*, and subsequently recorded from Java.

169. *Campylocera thoracalis* Hendel, 1913, var. *rufina* var. nov.

Female.—Similar to the type of the species from Maaø, Negros (C. S. Banks), in the British Museum, but differing in the coloration of mesonotum. The four shining black longitudinal stripes are in the present variety of a shining reddish color, which sometimes is only very little darker than the surrounding parts, and therefore the stripes are hardly visible. Chætotaxy of head (not distinct in Hendel's type): Three ocellars, all bent forward; one superior frontoorbital, bent forward; one postvertical, diverging outwardly; one inner vertical, directed inwardly; one outer vertical, smaller and directed outwardly.

Luzon, Laguna, Mount Maquiling (Baker).

Genus TYLOPTERNA novum

This genus is erected for an aberrant ortalid, which shows a very extraordinary appearance, having only a remote resemblance in the shape of head to the Ethiopian genus *Pteragenomyia* Hendel, which is assigned by its author to the tribe Trapherinæ.

Head broader than the thorax, truncate anteriorly, being in profile view exceedingly narrow, while in front view it has the aspect of the specimen figured by Hendel,¹² but it is less produced upward. Head broader than high, having more the shape of a

¹² Genera Insectorum, Platystominae, Plate III, fig. 48.

rectangle than that of a trapezium. Occiput little convex and the neck short, the head, therefore, being close to the thorax. Frons broad, slightly concave, placed in the same line with the face, lower than the eyes; the ocelli disposed in a small triangle, being very close together, and placed on the middle of the vertical keel, almost at equal distances from neck and from face of antennæ.

Eyes bare, rather small, twice as high as broad. Face a little shorter than the frons, but considerably broader, the eyes showing a prominent angle inward on the line of the antennæ; face concave, not at all prominent even at mouth border, and on the sides produced into a short point below the under corner of eyes. Lunula linear, concealed. Antennæ very short, close together at base, inserted at middle of eyes, directed outward, the third joint almost circular and as long as the second; second with a bristle above at end; arista basal, long, thin, microscopically pubescent. Antennal furrows horizontal, directed outward, placed just below the dividing line between frons and face, and parallel with this line. Oral opening retreating, concealed behind the straight edge of mouth; praeflabrum not visible; proboscis proportionally small; palpi dilated at end. Chætotaxy of head reduced to a single pair of vertical bristles, placed outward, near the eyes.

Thorax short, subquadrate, slightly convex; suture slightly caudad of middle, broadly interrupted; humeral calli prominent; pleuræ regularly convex. Thoracic chætotaxy not well distinguishable in the type, only the anterior supra-alar being distinct, but rather thin. Scutellum of great size, as long as broad at base, flat, simple, with two pairs of bristles near the end. Mesophragma small, less convex, subquadrate. Squamæ rudimentary; halteres with a large knob. Abdomen short, narrower than thorax, and a little constricted toward the base; hypopygium ventral, of medium size. Legs of proportional size, simple; middle tibiæ without distinct apical spur.

Wings of great size, rather obtuse at end, hyaline, with black spots formed by rounded chitinous tubercles, and besides with a long strong spine (Plate I, fig. 2a) on lower surface in the second posterior cell. Veins bare; auxiliary vein very thin and less distinct; second longitudinal vein long, third and fourth rather sinuous, fifth very short, sixth wholly wanting; second basal and anal cells very narrow, narrowed to the base and almost indistinct.

It is possible that the peculiar chitinous black calli of the

wings, or at least the long spine of the underside, are found exclusively in the male; the female is at present unknown.

Type, *Tylopterna monstrosum* sp. nov.

170. *Tylopterna monstrosum* sp. nov. Plate I, fig. 2.

A curious little fly, of strange aspect and coloration.

Male.—Length of body, 2.8 millimeters; of wing, 3; breadth of wing, 1.2. Posterior part of head shining brownish, with a broad, rounded yellow spot beneath the vertex and with a broad yellow stripe at eye border, which unites below with the pale yellowish lower half of head. Anterior part of head whitish yellow, divided into two parts by a broad black horizontal line, which divides the frons from the face, and in which are placed the black antennae. Arista pale yellowish. Proboscis yellowish, palpi whitish. Short pubescence of head whitish; vertical bristles black.

Thorax shining black, smooth, with reddish brown pleuræ; pubescence whitish, bristles black. Scutellum shining black, with the sides and the underside pale yellowish, mesophragma shining black; halteres whitish. Abdomen uniformly shining black, with whitish pubescence and rather long whitish hairs on the sides; hypopygium black; venter pale yellowish. Legs with the coxæ and the tarsi pale yellowish, but the hind femora and the hind tibiæ black, the last with yellowish ends; front and middle femora with a subterminal brown streak above; pubescence short, whitish.

Wings grayish hyaline, iridescent, with yellowish veins and colorless stigma. End of the marginal cell filled by a large deep black spot, which is at least in part callously chitinized. The two chitinous calli deep black, rounded, and placed near the hind border, the smaller before upper end of second posterior cell, the larger at lower inner end of same cell, just at the angle between posterior cross vein and last section of fifth vein. On the underside of wing a strong, straight, chitinous spine, placed on middle of second posterior cell, below the angle of the posterior cross vein with the fourth longitudinal vein and directed inward. This spine is black, but its broadened basal part is grayish hyaline, like the wing membrane; its length is about 0.5 millimeter.

Luzon, Laguna, Mount Maquiling (Baker), one male.

171. *Antineura sericata* O. S. 1882.

Cagayan, Mindanao. A beautiful endemic species of great size. The ortalid genus *Antineura* also may be considered as

endemic, as the other species are generically different and must be placed in *Adantineura* Hendel.

172. *Xenaspis polistes* O. S. 1882.

Malinao, Tayabas, Luzon, and Butuan, Mindanao. Another endemic and very characteristic species of great size, very much like a vespid.

173. *Xenaspis extranea* sp. nov.

This species is not unlike *X. polistes* Osten Sacken in general aspect and coloration, but differs in having the apical cross vein of the second basal cell less oblique. This fact is in relation with the other that the wings in the present species are not susceptible of being folded along the middle line as they are in *polistes*, which gives the latter its wasplike appearance. The present new species agrees with *polistes* also in lacking praescutellar bristles, but it has a well-developed mesopleural bristle.

Female.—Length of body (without ovipositor), 10 to 12 millimeters; of wing, 8 to 10; of ovipositor, 1.5 to 2. Head entirely reddish yellow, rather shining on the occiput, the latter with two small black parallel streaks on the middle, extending from the neck to the sides of the vertex; frons opaque, darker in the middle, with short yellowish pubescence; ocellar dot black; the two pairs of vertical bristles, the only macrochaetae of the head, black; face pale yellowish in the middle, reddish on cheeks and on the sides below; antennal grooves with a long black streak at lower end. Antennae a little longer than half the face, entirely pale yellow. Third joint somewhat attenuated at end, with a long, thin basal arista, which is shortly pilose above on the basal third. Palpi reddish, with darker base and yellow hairs; proboscis thickened and dirty yellowish brown.

Mesonotum entirely reddish yellow, darker on dorsum and with short yellowish pubescence; humeral calli, a longitudinal stripe above the notopleural line, a broad and oblique mesopleural stripe ending at the sternopleural suture, and two broad, contiguous stripes rounded by propleural spots yellow. Scutellum entirely yellow, with the base narrowly reddish brown; mesophragma shining reddish. Macrochaetae black—two notopleurals, three supra-alars, one mesopleural, and one scutellar apical; sometimes exterior scapular bristles on one side only, the humeral always wanting; scutellum sometimes with two or three more bristles near the end; sometimes also a weak praescutellar bristle on one side only. Halteres yellowish. Abdomen longer than thorax, distinctly narrowed at base, but not properly stalked; it is entirely reddish yellow, with short yellowish pubes-

cence; the posterior part of first segment and the two following segments almost entirely occupied by a dark brown transverse band, which is sometimes interrupted in the middle, forming two broad blackish spots on each segment. Ovipositor broad, flattened, entirely reddish; venter blackish brown. Legs yellowish, coxae reddish, tibiae darkened, tarsi blackish at end; apical spur of middle tibiae black.

Wings with a uniform yellowish tinge, which becomes brownish along the fore border from base to apex, where it is dilated to form an elongate spot, which surpasses the third longitudinal vein, reaching almost the fourth vein; third and fourth longitudinal veins slightly converging toward the end, the first posterior cell being, therefore, a little narrowed outwardly; anterior cross vein distinctly before the middle of the very long and narrow discoidal cell; apical cross vein of the second basal cell only a little more oblique than that of the anal cell, the last being perpendicular to the anal vein. Last two sections of the fourth longitudinal vein practically of the same length, second section considerably shorter than the third.

Luzon, Laguna, Mount Maquiling (Baker).

174. *Elassogaster plagiata* sp. nov.

A species with the facies of a *Stenopterina*, with complete thoracic suture, and with a small, oblique, anterior cross vein (almost as in *Elassogaster trivittata*), distinct from any other species of its genus because of the broad fuscous patch on wings in front of the posterior cross vein.

Female.—Length of body, 10 millimeters; of wing, 8. Head black, opaque, and deep black on frontal band, gray-dusted on face, and shining bluish on occiput, which shows a whitish-dusted border near the eyes. Vertex gray with two equal parts of strong, but short, black bristles; no other bristles on head. Frons with short shining yellowish pubescence along the middle line and above the antennæ. Antennæ inserted a little below the middle of eyes, shorter than the face; the two basal joints dark reddish brown; the third black, gray-dusted, obtuse at end, with a basal dark yellowish arista, which is shortly plumose on the basal two thirds. *Praelabrum* transverse, shining black; palpi and proboscis black.

Thorax and scutellum dull bluish black, the pleuræ a little shining and a little greenish, the sternopleura and a transverse band gray; bristles black, the scutellum with the apical pair alone. Mesophragma shining black. Halteres whitish, with the stalk black near the base. Abdomen of the same color as

thorax, with a soft white pubescence; the first segment with the basal part restricted to form a distinct stalk and black in the apical half, ovipositor blackish brown. Legs uniform bluish black with short gray dust; front femora not bristly below; spur of middle tibiae long.

Wings hyaline, with a faint yellowish tinge and with the veins black; costal cell brownish, subcostal cell black; at apex a short brown apical border, which begins as a very narrow line after end of second vein and, becoming gradually broader, ends at the fourth vein, where it is truncate and incloses a broad, subhyaline patch in the apical part of first posterior cell. The cross veins not infuscated; in front of and in contact with the posterior cross vein a broad fuscous band, which begins near the middle of first posterior cell and ends at hind border. Cross veins at end of second basal and of anal cell perfectly straight and placed on the same right line.

Luzon, Laguna, Mount Maquiling (*Baker*).

175. *Scelostenopterina femorata* Hend. 1914.

A single male specimen from Mount Banahao seems to belong to the present species, which was briefly described by Hendel from Sulu Island from a unique mutilated specimen in the British Museum.

Length of body, 9.2 millimeters. Antennæ shorter than the face and entirely yellow. Abdomen very like that of *Stenopterina*, shining bluish green, white-pubescent, with two or three long, bristly black hairs on middle of the sides of first segment. Front coxae reddish, like the fourth anterior femora; all the tibiae and the tarsi dull black; hind femora shining bluish green.

176. *Pseudepicausta chalybea* Dol. 1858.

Dapitan, Mindanao, and Puerto Princesa, Palawan. Widely spread over the Malay Archipelago to New Guinea and already recorded from the Philippines as a *Stenopterina* by Osten Sacken.

177. *Scotinosoma typicum* sp. nov.

Hendel has revised this Loewian genus, which had been without a type, for an Australian species. But in the present collection there is a small fly which seems much better to agree with Loew's conception, being almost a *Rivellia* without sinuosity of the second section of the fourth longitudinal vein and with a very narrow marginal cell. The pattern of wings is the same as described by Loew; but it must be recorded that in the Oriental Region there are some species of true *Rivellia*, like *costalis* Hendel, which show an analogous pattern on wings.

Female.—Length of body, 3 millimeters; of wing, 3. Head entirely black, only the broad frontal stripes being dark reddish brown in middle and in front; frons narrower than an eye, with parallel sides or only a little narrowed near the antennæ; lunula deep black; antennæ free, inserted at the middle of eyes, shaped as in *Rirellia*, as long as the face, the third joint becoming gradually attenuated, with a basal, microscopically pubescent arista. Prælabrum greatly developed, but retracted, shining black; palpi and proboscis black. Bristles of head black, two pairs of frontoorbitals directed backward, ocellar short, postvertical small, two pairs of strong and long verticals, the inner pair converging; frontal hairs scattered.

Mesonotum longer than broad, little convex, entirely of a rather shining greenish color, more black on the pleuræ; the short hairs along the dorsocentral lines black and extended to the fore border; macrochaetae black, one humeral, two notopleurals, three supra-alars, one dorsocentral, but I cannot perceive a trace of mesopleural. Scutellum colored like the dorsum of mesonotum, bare, with four long black marginal bristles. Mesophragma shining black, with faint metallic reflections. Squamae small, white; halteres yellowish.

Abdomen a little longer but not broader than the thorax, distinctly narrowed at base, scarcely punctulate, entirely shining black-aëneous, with a purple band at base of third segment; pubescence short and pale; venter dull black; ovipositor shining black-aëneous, flattened. Legs proportionally long, simple, entirely black, only the basal joints of all the tarsi dark reddish brown; apical spur of middle tibiae well developed, black.

Wings hyaline, iridescent with a black fore border which fills the costal, subcostal, and the base of the marginal cell, ending at the apex of first longitudinal vein; besides there is an elongate, apical brown spot filling the extreme end of submarginal cell and extending a little over the third vein, where it ends truncately. Veins pale yellowish with the exception of the first three, which are blackish; first vein ending a little before the middle of wing and near to the costa; second vein rather short and near to the first and to the costa, the marginal cell being thus exceedingly narrow, almost linear, not broader than the costal cell; third vein long, ending at apex of wing, perfectly straight, the submarginal cell broader than the first posterior cell, which is faintly dilated at end; fourth vein entirely straight, without any curvature in the discoidal cell on its second section; fifth vein short, diverging; sixth extended to the hind border. Discoidal cell very short, of almost triangular shape; cross veins very close

together, the outer one placed after middle of discoidal cell, and its distance from the posterior considerably shorter than the length of the posterior cross vein itself; anal cell a little shorter than the second basal, its terminal vein a little bent outward in the middle.

MINDANAO, Dapitan (*Baker*).

178. *Rivellia hendeliana* sp. nov.

Nearly allied to the endemic species *R. fusca* Thomson, but at once distinguished by the second dark band of the wings being twice as broad, and very like that of the Ethiopian species, *R. latifascia* Hendel,¹² but not reaching the hind border. Named in honor of Friedrich Hendel, of Vienna, whose marvellous work on the Ortalidæ, and chiefly on the Platystominæ, has rendered possible the determination of the beautiful flies of this family.

Male and female.—Length of body, 3.8 to 4 millimeters; of wing, 3.5 to 3.7. Head entirely black; occiput rather shining, with an argenteous border at eyes, which begins near the middle with a short horizontal line and is continued below to the chin; frons with the broad middle stripe dark reddish brown, more distinct in the male than in the female, and with a narrow argenteous lateral line, which is continued below on the narrow cheeks; face with whitish dust, shining black below; antennæ black, only a little dark reddish at base, with a dark, microscopically pubescent arista; prælabrum shining black; proboscis and palpi black, the last with narrow yellowish apical borders; bristles black.

Thorax and scutellum shining black, with faint dark gray pollen and black hairs and bristles; pleuræ and mesophragma shining black. Squamæ white; halteres yellowish. Abdomen entirely shining black in the female, with the base broadly orange reddish in the male; the short pubescence pale; male genitalia black with yellow penis; ovipositor dull black. Legs black, the tarsi entirely whitish in the male, with the last three joints blackish in the female. Wings exactly as in *R. fusca*, only second dark crossband is much broader than the two contiguous hyaline spaces and passes below the fifth longitudinal vein, ending toward the middle of the third posterior cell.

Luzon, Laguna, Los Baños (*Baker*).

179. *Loxoneura decora* Fabr., 1805, var. *bakeri* var. nov.

About the same as small specimens of *L. decora*, but distinguishable as follows:

¹² Op. cit., Plate II, fig. 30.

Male.—Frons slightly but distinctly narrower; third antennal joint proportionally shorter and broader; antennæ considerably shorter than the face; mesonotum without anterior band of white dust; pleuræ destitute of shining white pollen. Tibiæ of male with no distinct tubercle above end.

In the wing pattern there are the two following considerable differences: *a*, the yellow patch at fore border is continuous, not at all interrupted by dark and hyaline spots; *b*, the brown pattern around the anal cell is much broader, extending as a broad band along the anal vein and reaching the hind border.

The sexual differences in wing pattern described by Hendel from Javan specimens are quite absent; thus the middle of the second posterior cell is wholly hyaline, without any oblique dark band; the brown border of the fifth longitudinal vein has below toward its middle no dentiform projection.¹⁴ The discoidal cell is completely infuscate only in its distal eighth part.

PALAWAN, Puerto Princesa (*Baker*).

180. *Lamprogaster placida* Walk. 1849.

Female.—A specimen from Butuan, Mindanao, answers rather well to the short original description of this endemic species, which is the only member of this very large oriental genus as yet found in the Islands; but Osten Sacken records another, unnamed species. The brown wing pattern consists in an irregular band at base of the first basal cell, continued below over the basal and anal cross veins; a narrow oblique band, which beginning at middle of the blackish brown stigma encroaches on the anterior cross vein and ends a little distad of the fourth longitudinal vein; a narrow, complete border of the posterior cross vein and a short streak at fore border just opposite to it ending a little before the third longitudinal vein; a narrow apical border which begins at the above-named streak and ends at apex of the fourth longitudinal vein. The abdomen is entirely shining metallic to the base; the legs are entirely black, even on the tarsi.

181. *Scholastes cinctus* Guér. 1832.

Numerous specimens from Los Baños and Mount Banahao. Already known from the Islands and very common in the Orient; recorded also from New South Wales.

Gorgopis cristiventris of the first century, No. 59, is now placed in the genus *Tropidogastrella* Hendel; there are specimens also from Mount Maquiling.

* But in the male specimens of typical *L. decora* from Singapore in my collection these sexual characters are also absent.

182. *Zygenua paradoxa* Dol. 1858.

Mount Banahao, Luzon, and Butuan, Mindanao. A very curious fly, new for the Philippines, and previously known only from Amboina. The body is almost quadrate; the present specimens measure 5 to 5.5 millimeters in length and 3.6 to 4 millimeters in breadth. The species seems to be variable in coloration; in some specimens the entire occiput is black, while in others it is wholly reddish; the legs have the femora partly or entirely reddish yellow, or the four posterior femora are black on the basal half; the ovipositor is sometimes black, with bluish base.

183. *Naupoda unifasciata* sp. nov.

A small species, closely allied to *N. contracta* Hendel, from Formosa, and different from the typical endemic species *N. platessa*, besides the very different coloration, in having a pair of frontoorbital bristles, which are wanting in that species.

Male.—Length of body, 3 millimeters; of wing, 3.2. Head black; frons and face dark reddish brown, shining; frons about as broad as long, with parallel sides, with the eye borders very narrowly white and continued on the cheeks; face concave, with rather prominent mouth border; antennæ entirely reddish yellow, the third joint obtuse at end and shorter than the face, with finely pubescent arista; prælabrum short, not prominent, yellowish; palpi yellowish; proboscis brown; pubescence of the frons yellowish; bristles black; the single pair of frontoorbitals directed backward and weaker than the two pairs of equally strong but short verticals, the inner pair converging.

Thorax stout, as long as broad, shining black, finely and scarcely punctulate, with very short dark pubescence; bristles black and very short; pleuræ convex, smooth, glistening, black. Scutellum of great size, colored and punctulate like the dorsum, with a pair of very short, stout bristles near the end. Squamæ small, pellucid, brownish; halteres brownish, the knob blackish above.

Abdomen short, almost triangular, smooth, shining bluish black, glistening, with short and soft whitish pubescence; the two first segments raised, forming a triangular keel, very acute toward the middle. Coxæ and femora dark brownish, with short dark pubescence; tibiæ paler; front tarsi blackish, the posterior four entirely whitish.

Wings grayish hyaline, with a faint yellowish tinge; the base of the second costal cell in middle, the base of the first basal and the whole upper part of the second basal pale brown;

in the middle of wing a single, narrow, curved brown band, which begins at end of the first basal cell in front of the anterior cross vein, fills out the end of the discoidal cell, surrounds the hind cross vein, and ends at apex of the fifth vein; the upper half of this band darker than the lower half. A short pale brownish streak extends from the end of the first longitudinal vein to the middle of the submarginal cell. Anterior cross vein on the last third of the discoidal cell and near the hind cross vein, which is oblique and a little longer than the distance between the two transverse veins; last sections of third and fourth veins straight and almost parallel, the first posterior cell being only a little broadened at end; the section of the sixth vein after the anal cell longer than the apical cross vein of the anal cell. The entire wing surface strongly pubescent, the third longitudinal vein covered with long scattered hairs on its whole length. Discoidal cell a little longer than the second basal cell.

Luzon, Laguna, Mount Maquiling (Baker).

Key to the Philippine species of the genus Pterogenia Bigot.

It seems that this genus, although not yet recorded from these Islands, is represented by a great number of peculiar endemic species; at least I have found in Professor Baker's collection no less than six species, none of which can be referred to any of the twenty-seven oriental species included in Hendel's monograph.

- a'. Scutellum entirely black.
- b'. Frons as broad as an eye; mesonotum with yellow stripe on each side of dorsum, from suture to acutellum; a very robust species of proportionally large size, with only banded, not spotted, wings.
valida sp. nov.
- b'. Frons narrower than an eye; mesonotum entirely black or only with a notopleural yellow stripe; smaller species, with banded and spotted wings.
- c'. Occiput entirely black, even below, or only with a narrow yellow stripe on upper part; mesonotum without a yellow notopleural stripe tristis sp. nov.
- c'. Occiput with a broad yellow postocular border; mesonotum with a yellow notopleural stripe parva sp. nov.
- a'. Scutellum margined or striped with yellow, at least on sides.
- d'. Frons broader than an eye; head broader than high; second abdominal segment with a longitudinal keel; legs entirely reddish; wings yellowish, not banded, and with numerous dark spots.
laticeps sp. nov.
- d'. Frons narrower than an eye; head higher than broad; second abdominal segment without keel; legs mainly black; wings distinctly banded.

- e'. Scutellum black, with a narrow yellow hind border; no yellow stripes on dorsum of mesonotum or on sternopleura; wings distinctly yellow at base..... *luteipennis* sp. nov.
- e'. Scutellum yellow, with a black central spot; dorsum and sternopleura with yellow stripes; wings without yellow at base.
centralis sp. nov.

184. *Pterogenia valida* sp. nov.

A stout, short, and broad species, closely allied to the Bornean *P. dayak* Bigot, but easily distinguished by the black legs, the shortly plumose arista, and the compressed ovipositor.

Female.—Length of body, 8 millimeters; of wing, 8; breadth of body, 4.2. Head greatly developed, rather flat, about as high as broad, black with yellow markings. Occiput rather concave above, glistening black on middle, with a dull deep black border and besides with a complete yellow border, which is narrow distad of the vertical keel and near the upper eye border, but broader on the dilated and produced inferior part. Frons as broad as an eye, somewhat shining black on sides at vertex, opaque brown on the middle band, with a broad yellow border on each side, which is continued over the broad cheeks, ending with a point at some distance above the mouth border; face concave, black, shining on the antennal grooves, which are separated by a flat yellow keel; epistoma broad, blackish brown, prominent; jowls very broad, about one half as broad as the vertical diameter of eye, rugulose, black except the terminal points of the yellow stripes of cheeks and of occiput. Lunula black, dark yellowish on the sides. Antennæ short, much shorter than the face, entirely black; third joint gradually attenuated, but obtuse at end, with a basal, shortly plumose blackish arista, the total breadth of feathers being equal to the breadth of the third joint. Praelabrum very narrow, retracted, blackish; proboscis and palpi black, the latter very broad and provided with short dark hairs; a single pair of vertical cephalic bristles, the inner one black; the short and dense frontal pubescence black on the middle stripe and whitish on the yellow borders.

Mesonotum and scutellum shining black, but the first on dorsum appears to be less shining on account of the coarse punctulation; clothed with short black pubescence and provided with black bristles; scutellum bordered with about fourteen short bristles. A broad, faintly curved yellow stripe on each side of dorsum, extending from the suture to the scutellum; a broader, but shorter, yellow stripe extending from the small black humeral calli to the root of the wings. Pleurae and breast entirely black, glistening, with rather long and dense black hairs.

Mesophragma shining black. *Squamæ* broad and long, pellucid grayish, with pale yellowish and whitish pilose borders; halteres pale yellowish, proportionally small.

Abdomen very short and broad, strongly convex in the middle, finely punctulate, with short dark pubescence and rather long black hairs on the sides; it is shining black, with bluish reflections on the sides. Second and third tergites with a narrow, but complete, yellow hind border; the third segment with the peculiar, triangular area of *P. dayak*, situated at middle of hind border and clothed by a soft, spongy membrane; fourth segment very narrow, entirely bluish; ovipositor short and black, its basal segment compressed, not depressed as usual. Venter black. Legs rather stout, entirely black even on the coxae, and with black pubescence; femora only a little dark brownish near the base above; the two basal joints of all the tarsi whitish yellow and whitish pubescent, the last three joints deep black.

Wings grayish hyaline, distinctly yellowish along the costal cell. An irregular fuscous band extending over the base of the first basal cell and over the ends of the second basal and anal cells; a second rather broad brown band begins below the brown stigma and, passing over the anterior cross vein, ends a little after the fifth vein; along the costal border a series of three dark spots in the form of three abbreviated bands, which surpass only a little the third vein and are placed at the ends of the first, second, and third veins; the intermediate one of these spots sometimes continued to reach the more or less developed fuscous border of the hind cross vein. Anterior cross vein long, placed a little before the middle of the discoidal cell; third and fourth veins straight and perfectly parallel; anal cell a little shorter than second basal cell, its terminal vein being slightly curved outward.

Luzon, Laguna, Los Baños (*Baker*). Mindanao, Butuan (*Baker*).

185. *Pterogenia tristis* sp. nov.

Very near *P. luctuosa* Hendel from Formosa, but at once distinguished by the much richer wing pattern.

Male and female.—Length of body, 5 millimeters; of wing, 5. Head as in *P. valida*, but the frons distinctly narrower, and the vertical diameter longer than the horizontal one, the jowls narrower. Frons yellow, with two black crossbands, one near the vertex including the ocelli and the other a little distad of the middle; these two bands dilated on the sides in the form of spots and united with a dark middle line; cheeks yellow and very

narrow. Face yellow, with a black middle spot, another smaller spot on each side below the black spot, and a narrow black line at mouth border; jowls only one third of eye, black, with a yellow spot near the eye; lower orbital border not dilated, black, with more or less extensive yellow spots. Antennæ much shorter than the face, black at base; third joint yellowish, with infuscated apical half; arista more shortly plumose than in *P. niveitarsis*, but longer than in *P. luctuosa*, the breadth of feathers being almost equal to the breadth of the third joint. Prælabrum narrow and blackish; palpi yellowish, black-haired; proboscis brown.

Mesonotum and scutellum entirely black, opaque, punctulate, with short black pubescence; dorsum in front with three less distinct longitudinal gray stripes. Mesopleura with a narrow, less distinct, longitudinal yellowish stripe. All the bristles black; scutellum with a single, long, apical pair, and near this four or five other pairs of much shorter bristles. Squamæ whitish, with pale yellowish border; halteres yellowish.

Abdomen shining black, smooth; second, third, and fourth segments in the male with a narrow yellow hind border, a little dilated toward the middle; male genitalia black. In the female the abdomen entirely black, at end only with a broad yellowish membranous patch at base of the ovipositor; the last with the basal segment depressed, black. Legs black, even on the coxae; the four posterior tibiae with a middle yellowish ring and yellowish bases, all the tarsi whitish, with blackish ends.

Wings with numerous dark spots on the basal half, a broad, middle brown band from stigma to the hind border interrupted on lower half by hyaline spots, and a broad, complete brown band from apex of the marginal cell to the middle of the hind border of the second posterior cell; in the hyaline space between these two bands a series of spots forming a narrow, irregular band united with the narrow fuscous border of the hind cross vein; in the hyaline apical part of wing there are also three or four dark spots, forming one or two irregular and shortened bands. First posterior cell distinctly dilated outward; anterior cross vein on the middle of the discoidal cell; anal cell much shorter than the second basal cell, with the terminal vein straight.

Luzon, Laguna, Mount Maquiling (Baker).

186. *Pterogenia parva* sp. nov.

Closely allied to *P. tristis*, but distinguished by the yellow notopleural stripe, the shining dorsum of mesonotum, and the longer plumose arista.

Female.—Length of body, 4 millimeters; of wing, 4. Head as in *P. tristis*, but the frons narrower and more elongate, being about twice as long as broad, and black with a narrow yellow vertical band; a broader yellow supra-antennal band; and two yellow spots before the middle. Yellow lower borders of eyes broader; face with only two black spots at end of the antennal grooves; third antennal joint entirely yellow; feathers of the arista twice as broad as the third antennal joint; prælabrum yellow; palpi black. Mesonotum and scutellum shining black, punctulate, with short black pubescence; humeral calli yellow, like a notopleural stripe extending to the root of wings; pleura altogether shining black and black-haired. Halteres yellowish.

Abdomen entirely shining black, even on the base of the ovipositor, smooth; ovipositor black, depressed. Legs black, but the hind tibiae almost entirely yellowish, without differently colored ring; tarsi whitish, with blackish ends.

Wings as in *P. tristis*, but the dark spots of the basal less numerous and with a distinct basal band before the anterior cross vein; fuscous border of the hind cross vein broader; the spots in the hyaline apical part less developed. Anterior cross vein a little beyond middle of the discoidal cell; anal cell much shorter than the second basal cell; cross vein at end of the second basal cell shorter than the second section of the fifth vein, which makes its lower border.

MINDANAO, Butuan (Baker).

187. *Pterogenia laticeps* sp. nov.

A robust species, which in the form of head and in general aspect is very like *P. dayak* and *P. valida*, but differs very much in coloration of body, legs, and wings; in the shape of the second abdominal tergite it shows an affinity with the Bornean *P. alborvitata* Rondani.

Female.—Length of body, 7 millimeters; of wing, 6.5; breadth of body, 3. Head broader than high, yellow with black markings. Occiput above with a black transverse band between vertex and neck; frons broader than eye, as long as broad, with two black parallel crossbands, the broader one situated near the vertex and including the ocelli, the other narrower and placed distad of the middle, united to the preceding band by a black middle stripe; the short frontal pubescence black, like the single pair of vertical bristles; lunula shining black, frons opaque. Face broad, entirely dull yellow, a broad black spot, shining in the middle, just below the lunula and forming with it a single rounded spot at the root of antennæ; a narrow black semicircular line, interrupted in the middle and dilated in a spot on

each end, which divides the broad but flat epistome from the jowls. Cheeks yellow and much narrower than in *P. dayak*; jowls as broad as in *P. dayak*, as long as one half of the vertical diameter of eye, lighter yellow than the face, and clothed with numerous, short and dense black hairs; on the prominent and dilated lower occipital border are two small dark spots near the eye, above the inferior angle. Antennæ yellow and much shorter than the face, the two basal joints with a black spot on interior side; arista shortly plumose, the feathers being about as broad as the third joint. Prælabrum retreating, narrow, yellow, white-dusted; proboscis yellowish brown; palpi broad, yellow, with short and scanty blackish hairs.

Mesonotum and scutellum dull black, punctulate, with short black pubescence; on each side of the dorsum, from suture to scutellum, a rather narrow shining yellow stripe, curved outward at end and accompanied inward by a short yellow streak, in continuation with that of the scutellum; sutural calli yellow, conspicuously cutting into the deep black sides of dorsum; humeral calli yellow; a yellow stripe just below the notopleural line from humeral calli to the root of the wings. Pleuræ deep black, smooth, shining only on the posterior half, with dense and long black hairs and with a narrow yellow horizontal stripe on the lower half of mesopleura parallel with the notopleural stripe. Scutellum black, shining along the hind border, with four longitudinal yellow streaks; two longer, curved outward at end and situated on middle of the sides; two much shorter and paler, placed at apex. Thoracic and scutellar bristles black, scutellum with the apical pair alone, placed just in the middle of each apical yellow stripe. Squamae whitish, with yellow border; halteres yellowish. First abdominal segment black, concealed below the very large scutellum; second segment black, with a complete reddish yellow stripe along the hind border and raised in the middle to form a very sharp keel, which is black before and reddish yellow behind; third segment reddish yellow, with narrowly black sides below and with a deep oval fovea in the middle, homologous with those of *P. dayak* and *valida*; fourth segment not visible; ovipositor short, depressed, black; venter yellowish on middle, black on sides.

Abdominal pubescence black on the black parts and golden on the reddish yellow parts. Legs stout, entirely reddish yellow; the coxae, chiefly those of the front pair, broadly black behind; front femora with a brown longitudinal streak outside at base; all the tibiae infuscated at end; the first joint of all the tarsi whitish, the others brown; the pubescence black.

Wings with a yellow tinge, which is more intense on the basal half and along the fore border; they have a few dark spots, arranged to form crossbands—a basal, less-defined one, a middle one more developed and double, and three others on apical part after the hind cross vein, which is narrowly bordered with fuscous along the inner side only. Veins yellow; third and fourth a little wavy, the first posterior cell dilated at end; anterior cross vein on middle of discoidal cell; second basal cell much longer than the anal one, its two apical cross veins being of about the same length; anal cross vein straight.

Luzon, Laguna, Los Baños (*Baker*).

188. *Pterogenia luteipennis* sp. nov.

A distinct species near *P. pectoralis* Hendel, from New Guinea, but at once distinguished by the yellow base of the wings.

Male and female.—Length of body, 5.5 to 6 millimeters; of wing, 6 to 6.5; breadth of body, 2.8 to 3. Head much higher than broad. Occiput black, with a complete yellow border which is narrow above and broader on the produced lower part, and there with a black spot, situated behind the inferior corner of eye. Frons narrow, length more than twice the breadth, opaque, dark yellow, with a basal and a middle crossband, united by a median longitudinal stripe. Lunula black, with a brown spot on each side between antennæ and eye. Face short, concave, continued below by the very broad epistoma, yellow, with a black transverse band at end of antennæ; cheeks narrow, yellow; jowls very broad, as broad as one half of eye, rugulose, yellow, with a broad black band, which is in continuation of that of face. Prælabrum concealed; palpi black; proboscis brown. Antennæ short; first joint black, second globular and red, third pale yellow; arista long plumose, the feathers twice as broad as the third joint.

Mesonotum and scutellum black, opaque, punctulate, black pubescent; three less distinct and irregular cinereous longitudinal stripes on dorsum, humeral calli yellow like the notopleural stripe; mesopleura toward the middle with a narrow yellowish stripe, which is cinereous-dusted above. Yellow border of scutellum complete, but narrow. Squamae and halteres yellowish. Abdomen dull black, the second, third, and fourth segments each with a narrow yellow hind border, which is a little broadened in the middle; second segment without keel; male genitalia yellow; ovipositor short, compressed, brownish yellow; venter yellowish, black on the sides. Legs and coxae black, the four posterior tibiae with the basal half yellowish, and all the tarsi with the first joint whitish.

Wings rather long, with a strong yellow tinge along the fore border and on the basal half; on the basal half some dark spots and two broader dark bands, one intermediate and complete below the stigma, and the other surrounding the posterior cross vein; a dark stripe to the fourth vein in the hyaline space between the two bands and some uncertain spots in the apical hyaline part. Veins yellow, the third and fourth straight and parallel to the end; anterior cross vein a little before the middle of the discoidal cell; anal cell not much shorter than the second basal cell, with the terminal cross vein straight.

Luzon, Laguna, Mount Maquiling and Mount Banahao (Baker).

189. *Pterogenia centralis* sp. nov.

Allied to *P. luteipennis*, but distinguished by the very different coloration of mesonotum and scutellum.

Female.—Length of body, 5.5 millimeters; of wing, 5.5. Head as in *P. luteipennis*, the shining occipital yellow border without black spot in the dilated part; frons yellow, with an elongate, double reddish brown spot in the basal part; face with a rounded black spot at end of the antennal grooves and with a narrow black line, dividing the epistoma from the jowls without black crossband. Antennæ as in *P. luteipennis*, but the second joint black and the arista more shortly plumose, the breadth of feathers being only equal to the breadth of the third joint. Mesonotum and scutellum black, opaque, with dense shining yellowish pubescence; on dorsum a yellow stripe from the yellow humeri to the suture, curved inward at end, and another from the suture to the scutellum, a yellow notopleural stripe, and below this two broad, parallel yellow stripes—one on mesopleura, the other on upper part of sternopleura; hairs of pleurae whitish and yellowish.

Scutellum yellow, with a basocentral, rounded black spot. Squamæ whitish; halteres yellowish. All the bristles black; on scutellum a pair of long apical bristles and some other pairs of shorter ones. Abdomen as in *P. luteipennis*, but the yellow hind borders of second and third segments broader, and the third segment with a middle longitudinal yellowish stripe; pubescence black, but yellowish on the yellow parts; ovipositor black, depressed; venter black, with black hairs. Coxæ black; femora reddish brown with blackish stripes below and behind; tibiae yellowish with black ends; tarsi whitish, with the last three joints black. Wings whitish hyaline with only the extreme base less distinctly yellowish; three complete fuscous crossbands,

the first near base, the second below the stigma and crossing the discoidal cell, the third extending from apex of the marginal cell to the middle of the second posterior cell; the hind cross vein margined with fuscous only below and not included in a band, but above it from costa to a little before the fourth vein there is a dimidiate crossband in the hyaline space between the second and third crossbands; in the apical hyaline space some fuscous spots, forming one or two irregular crossbands. Veins yellowish brown, directed as in *P. luteipennis*, but the second longitudinal vein distinctly a little wavy, not straight; anal cross vein distinctly longer than that at end of the second basal cell.

MINDANAO, Butuan (Baker).

Key to the Philippine species of the genus Euprosopia Macquart (including Notopsila Osten Sacken).

The present genus also seems to be productive of endemic species in the Philippines. No one of the five species found by Professor Baker can be identified with any of the thirty-three species already known from the Oriental and Australian Regions: the group of the species with elongated antennæ (*lepidophora*, *longicornis*) seems to be peculiar to the Islands. The two species, *sexpunctata* and *curta*, described by Osten Sacken under the generic name of *Notopsila*, also belong here, but are wanting in the present collection; *Euprosopia curta* was recently recorded from Formosa by Hendel.

- a'. Scutellum emarginate, that is, distinctly hollowed at apex; arista bare; wings spotted.
b'. Face with six deep black spots *sexpunctata* O. S.
b'. Face without black spots *curta* O. S.
- a'. Scutellum not emarginate, convex at apex; arista shortly plumose; wings usually banded.
c'. Antennæ much shorter than the face, as usual.
d'. Mesonotum adorned with three broad longitudinal bands of yellowish tomentum, the middle of which is continued on scutellum and abdomen; front tarsi with yellow bases; wings distinctly yellowish, with fuscous spots *trivittata* sp. nov.
- d'. Mesonotum and abdomen altogether black, without such stripes; front tarsi black; wings not yellowish and distinctly banded.
e'. Much larger; abdomen without white scales; front tarsi much dilated; wings with the second and third bands united with the broad fuscous border of the hind cross vein.
gigas sp. nov.
- e'. Much smaller; abdomen with scattered white scales; front tarsi not dilated; wings with only a single distinct band between the numerous dark spots *millepunctata* sp. nov.
- c'. Antennæ as long as the face, or even a little longer; abdomen with scattered white scales; wings conspicuously banded.

- f'. Antennæ red; femora and tibiae entirely and intensively black.
lepidophora sp. nov.
- f'. Antennæ black; femora and tibiae in part reddish brown or yellowish .. .
longicornis sp. nov.

190. *Euprosopia trivittata* sp. nov.

A very distinct species, suggesting *Plagiostenopterina trivittata* Walker by its coloration and seeming to be allied to *E. tigrina* Osten Sacken, from New Guinea, which, however, has a very different wing pattern and has no inner frontoörbital bristles.

Male and female.—Length of body, 5 to 6 millimeters; of wings, 5 to 6. Head oval, much higher than broad, entirely yellow; occiput with dense gray dust, which becomes paler on the dilated lower part; frons once and a half as long as broad, broader than an eye, distinctly broader in the middle than at the ends, the middle band clothed with short yellow hairs and with a narrow white stripe on the sides, with a middle longitudinal dark line; lunula yellow; two pairs of black vertical bristles; face whitish-dusted, above with a short dark longitudinal band between the antennæ, and below with two black spots at end of the antennal grooves; cheeks narrow, much narrower than the third antennal joint; jowls about one fifth of eye, yellow, with a less distinct brown spot. Antennæ entirely yellow, a little longer than one half of face; third joint attenuated, but obtuse at end, with a short, basal, plumose arista, the breadth of feathers being equal to the breadth of the third joint. Prælabrum convex, circular, shining yellow, with a black spot on each side; palpi dilated, deep black, the apical border shining whitish and the thin base broadly yellow; proboscis yellowish.

Mesonotum opaque, black, but almost entirely occupied on the dorsum by the three equally broad longitudinal stripes of yellowish tomentum; the short pubescence yellow on the yellow stripes and black on the black ones; the hind border of dorsum with a row of long yellow hairs before the scutellum; bristles black; pleurae entirely clothed with yellowish tomentum, separated from the external stripes of the dorsum by the black notopleural band; hairs yellow and very long on the hind border of mesopleura and of pteropleura.

Scutellum black, convex at end, with the broad, middle yellow band exactly in continuation of that of dorsum; two pairs of apical black bristles, and rather long yellow hairs at hind border. Squamae and halteres pale yellowish.

Abdomen entirely clothed with yellowish tomentum like the

mesonotum, but with a black longitudinal stripe on each side not reaching the hind border, and thus forming the three longitudinal yellow stripes, the middle of which is exactly in continuation of that of scutellum and mesonotum; venter yellow and brown, rather shining. Male genitalia black, rounded, retracted, with some short black and red appendages below and with a very long, spiral, shining reddish penis; ovipositor short, black, flattened. Legs yellow, with yellow pubescence; front coxae mainly black; femora and tibiae broadly black at end, sometimes the anterior femora and even the middle ones entirely black with yellow ends; basal joint of all the tarsi whitish.

Wings with a distinct yellowish tinge at base and fore border; covered with numerous dark spots, which are in part confluent, but without forming distinct crossbands; hind cross vein with a broad fuscous border, and in continuation with it a subobsolete band, interrupted by hyaline spots, which ends at apex of the first longitudinal vein. Third and fourth longitudinal veins entirely straight and parallel in their last sections; anterior cross vein oblique and placed near the middle of the very long discoidal cell; second basal cell longer than the anal, which is terminated by a straight cross vein.

Luzon, Tayabas, Mount Banahao (Baker).

191. *Euprosopia gigas* sp. nov.

In wing pattern very similar to *E. impingens* Walker, from New Guinea, but distinguished by its different coloration and by the presence of two pairs of vertical bristles.

Female.—Length of body, 12 millimeters; of wing, 12. Head higher than broad, with the frons and the face much produced over the eyes, but perhaps only because of an accidental compression of the type specimen. Occiput hollowed, yellowish, with two black stripes; frons narrower than an eye, about twice as long as broad, hollowed in the basal half and there yellowish red, prominent in the apical part and there black, with narrow yellowish sides; bristles black, the inner vertical pair only one half as long as the external pair; lunula dark brown; face pale yellow, with a black stripe on each side along the antennal grooves, which is continued below to the mouth borders, but becomes brownish in this part; cheeks black and brown, a little narrower than the third antennal joint; jowls brown, one fifth of eye in breadth. Antennae black, the basal joint a little reddish outward, not longer than one half of face, with a long arista, which is shortly plumose at base, the feathers being as broad

as the third joint. *Pteralabium* narrow, subquadrate, shining yellowish; palpi less dilated, entirely black, with long black hairs; proboscis dirty yellowish.

Mesonotum dull black, densely punctulate, with short and thick black hairs, only in front of the scutellum with yellow hairs; bristles black, two or three anterior supra-alars; pleuræ black, gray-dusted, and with numerous rounded black points, with long, yellow hairs and some shorter black hairs on anterior part of mesopleura, sternopleura, and pteropleura. Scutellum flattened above, convex behind, reddish brown, darker at base, entirely clothed with shining yellow hairs, which are longer near the borders, and with three pairs of strong black apical bristles, the smaller, external pair being placed most distant from the border. Mesophragma black, smooth, rather shining; squamæ pellucid brownish with a whitish border; halteres yellowish. Abdomen black, finely punctulate, rather shining, with the last two segments brownish red; pubescence dark, the hind borders of the segments with longer whitish hairs; venter dull black, with whitish hairs on the sides; ovipositor black, flattened. Legs stout, brownish black, with black pubescence; front tarsi much dilated, entirely deep black; the basal joint of the four posterior tarsi whitish, with black ends. Wings destitute of yellowish tinge at base or fore border; the dark pattern is very like that figured by Hendel,¹⁵ but the first band is much broader; the second and third bands united with each other and with the broad border of the hind cross vein from the fourth longitudinal vein; the hyaline spaces between first and second bands and between second and third bands have in the middle two or three elongate brown spots, which form two narrow, interrupted stripes; the second posterior cell shows four or five dark spots along the hind border.

Luzon, Laguna, Mount Maquiling (Baker).

192. *Euprosopia millepunctata* sp. nov.

A small, dull blackish species, with a white-scaly abdomen and with a single dark crossband on the thickly punctuated wings.

Male.—Length of body, 4 millimeters; of wing, 4. Head blackish, a little higher than broad; frons with narrow dark yellowish lateral borders and with short yellowish hairs; two pairs of black vertical bristles; face dark yellowish on the middle, brownish on the sides, with a deep black spot at end of each antennal groove; cheeks brown, linear; jowls deeply rugose, reddish brown, one sixth of eye. Antennæ blackish

¹⁵ Die Art. d. Platyst., Plate II, fig. 38.

brown, dark reddish at base, a little produced over the middle of face; arista shortly plumose at base, the breadth of feathers being less than the third joint. Praelabrum convex, circular, shining black; palpi black, with narrowly yellow base; proboscis dark brown. Mesonotum entirely dull black, with short and scattered yellow hairs, and in front with the beginning of two longitudinal gray lines, which do not reach the suture; pleurae gray, with indistinct black points and with rather long yellow hairs at hind border of mesopleura. Scutellum like the dorsum of mesonotum, convex at end, with two pairs of apical black bristles. Squamae brownish pellucid; halteres yellowish. Abdomen entirely dull blackish, the last two segments densely gray-dusted and with scattered whitish scales; genitalia retracted, black like the venter. Legs stout, black, the femora brown toward the base, four posterior tibiae broadly yellowish in the middle; front tarsi entirely black, not dilated; basal joints of the other four tarsi whitish, with black ends.

Wings whitish hyaline, no yellow at base, with very numerous blackish dots and streaks, which are partly confluent, so that the wing may be said to be blackish with whitish hyaline dots; a distinct, rather broad crossband, beginning at fore border beyond the end of first vein, inclosing there two or three short hyaline streaks, crossing the middle of the first posterior cell and surrounding the hind cross vein, and ending at hind border at apex of the fifth longitudinal vein. Last sections of third and fourth veins straight and parallel.

Luzon, Tayabas, Malinao (*Baker*).

193. *Euprosoopia lepidophora* sp. nov.

Similar to *E. fusifacies* Walker, from New Guinea and Aru Islands, but distinguished from it and from the other species by the elongate antennae, which are produced to the mouth border.

Male.—Length of body, 7 millimeters; of wing, 7. Head in front with a rounded outline, about as broad as high, much broader and higher than the mesonotum; occiput black, with dense gray dust, whitish on the little-produced lower border; frons a little longer than broad, a little but distinctly narrower at vertex than in front, its broad middle stripe dark reddish, paler on the sides, with a narrow silvery border near the eyes and with scattered yellow hairs; two pairs of black vertical bristles, the inner pair only a little shorter than the external one; face flattened, much broadened below, in the form of an isosceles triangle, white, opaque, the upper angle and the base narrowly red. Antennal grooves long, diverging, yellowish white-dusted,

spotless; mouth border narrow, less prominent, with a narrow but complete blackish crossband; cheeks very narrow, linear, blackish; jowls one fifth of eye, blackish brown in front, whitish behind, and there with a very strong black genal bristle. Antennæ long, reaching the epistome, entirely red; third joint linear, very long; eight to ten times as long as the first two joints together; arista long, reddish, shortly plumose on its whole length, the feathers about as broad as the third joint. Prælabrum circular, convex, shining black; palpi broad, entirely black, with long, scattered black hairs; proboscis black.

Mesonotum short, subquadrate, black, dark gray-dusted and yellow-pubescent above; bristles long, strong, and black; pleura with dense pale grayish dust and long whitish hairs; on mesopleura a broad perpendicular band of whitish dust, which is continued above on the dorsum along the suture in the shape of a whitish triangle. Scutellum black, with yellow pubescence and with a spot of whitish dust on each side at apex, which is convex, not emarginate; two pairs of strong black apical bristles. Squamæ whitish; halteres yellowish. Abdomen black, gray-dusted; the last three segments provided with scattered, broad whitish scales. Venter and genitalia black. Legs deep black, with black pubescence, front coxae gray-dusted and white-pubescent anteriorly; basal joint of all the tarsi whitish.

Wings not yellow at base, the fuscous pattern about as in Hendel's Plate II, fig. 39; a dimidiate band before the middle band; the third band prolonged to the hind border, the apex of wing appearing entirely fuscous, with two hyaline spots.

Luzon, Tayabas, Malinao (*Baker*).

194. *Euprosoopia longicornis* sp. nov.

Closely allied to *E. lepidophora*, but smaller and differently colored.

Male and female.—Length of body, 5 to 5.5 millimeters; of wing, 5 to 5.5. Head exactly as in *E. lepidophora*, but the antennæ entirely black, a little dark brownish near the base; the third antennal joint longer, being a little longer than the face; the broad facial triangle more yellowish than white and destitute of red stripes; epistome without black band; the genal bristle much weaker.

Mesonotum and abdomen entirely as in *E. lepidophora*, ovipositor short, broad, flattened, black. Legs with the four posterior tibiae broadly yellowish on the basal half; hind femora with long and dense whitish hairs below.

Wings as in *E. lepidophora*, but the pattern less dark; the

hyaline space between the second and third bands has above near the fore border a fuscous triangular spot, prolonged to the second longitudinal vein, which is entirely wanting in *lepidophora* and in *fusifacies*; the praepical band is likewise complete, but there is no dark spot in the hyaline hind border of the second posterior cell.

LUZON, Tayabas, Mount Banahao (*Baker*).

195. *Teniptera nigripes* van der Wulp. 1881.

Los Baños, Mount Maquiling, Luzon. Philippine specimens like the present ones have been referred by Osten Sacken to this species described from Sumatra, but I think it probable that they belong to an undescribed species; the rings on femora are white, not reddish as in typical specimens.

196. *Eurybata hexapla* O. S. 1882.

Luzon, Laguna, Los Baños and Mount Maquiling. A very strange and beautiful endemic insect.

Telostylus niger Bezzi, 1913.—This species, described in the first century,¹⁰ seems to be common in the Islands, being also represented from Mount Maquiling; Professor Baker has reared it from fallen fruits of *Terminalia nitens* Presl.

Male.—The undescribed male is like the female, but is noticeably different in the front legs like the males of other species of the genus *Telostylus*. The front femora are provided below on the apical half with two rows of short black spines, those of the internal rows being distinctly longer. The basal joint of each front tarsus is considerably swollen and spindle-shaped. The femora of all the legs, and chiefly those of the intermediate pair, are distinctly thickened. The genitalia are prolonged as a cylindric protuberance, which is bent below, and in front of this there is another yellow prominence.

197. *Nothybus triguttatus* sp. nov.

Very like the typical species, *N. longithorax* Rondani, from Borneo, but differing in the wing pattern.

Male.—Length of body, 7 millimeters; of wing, 7. Head yellow. Occiput very much hollowed above, the eyes being prominent on the sides; frons with a deep and broad excavation at vertex behind the ocelli, and there with a striking velvety black subquadrate spot; the remainder of frons gently convex, strongly glistening, with a broad velvety black spot on each side, in contact with the eyes and of triangular shape, prolonged behind

¹⁰ This Journal, Ser. D (1913), 8, 329, No. 85.

along the orbits to their middle and in front entirely to cover the narrow cheeks. Face elongate, narrower than the frons, yellow above, whitish below and there with a prominent, oval, strongly glistening blackish brown tubercle, the surrounding area shining white; *prælabrum* prominent, triangular, whitish; palpi whitish, narrow, almost bare; proboscis yellowish. Antennæ short, inserted above the middle of eyes, the two basal joints yellow, with some black hairs and a longer bristle above at end of the second; third joint rather acute at end, not longer than the first two joints together, deep black with narrowly yellow base; arista blackish, incrassate at base, very long-plumose to the end. Cephalic bristles strong and black; two pairs of verticals, bent backward, the inner pair longer and placed more forward; two pairs of frontoörbitalis, likewise bent backward, of equal size, one at level of the ocelli, the other before the middle of the frons; no distinct ocellar or postvertical bristles. In profile view the head is almost entirely occupied by the eyes, which are rounded and of great size; frons only a little prominent above the antennæ; ocelli placed just at middle distance between the inner vertical and the anterior frontoörbital bristles.

Mesonotum entirely yellow, a little shining and a little darker on dorsum, more orange and opaque on sides and on pleuræ; conical and exceedingly prolonged in front; on dorsum clothed by short black hairs disposed in almost regular longitudinal rows; quite bare on pleuræ. Bristles black; no humeral; a single notopleural, the posterior one, placed apparently on the pleura, on account of the peculiar form of mesonotum, and just below the very oblique and broadly interrupted suture; one anterior and one posterior supra-alar; one pair of dorsocentrals very near the scutellum; one mesopleural. Scutellum elongate, triangular, with one basal and one apical pair of long bristles; postscutellum of a very peculiar form, in shape of an obtuse cone, more prominent than the scutellum itself, entirely yellow, opaque; mesophragma short, yellow, whitish-dusted. Squamæ very small, yellowish, with brown border; halteres yellowish, with brown knob.

Abdomen narrower than the thorax, elongate, linear, of equal breadth throughout; about as long as the mesonotum, entirely yellow, opaque, with short black hairs; the last segment whitish-dusted; the very small genitalia yellow, whitish-dusted, retracted, destitute of appendages. Venter pale yellow, with black hairs on the sides. Legs thin, not elongate; coxæ and femora yellow; tibiæ and tarsi black, but on these last the elongate pretarsi of the front pair whitish; front coxæ with some short black hairs

at end; middle coxae with a long bristle on the middle of anterior side; apical spur of middle tibiae very long, black.

Wings spatulate, constricted to form a long and narrow basal stalk; uniformly suffused with a pale yellowish tinge and with the apical third infuscated; the internal limit of this infuscation marked by a narrow, oblique brown band, which begins at fore border a little before the end of the marginal cell and, passing over the hind cross vein, ends at the fifth longitudinal vein. In this fuscous apical part are three distinct, oval, subhyaline spots, one in the submarginal, one in the first posterior, and one in the second posterior cell. Veins yellowish; the first longitudinal very short, ending at end of the stalked part of the wing; second very long, ending before the apex symmetrically with the fourth; while the third ends at the apex itself; these three veins are perfectly straight, placed at equal distances, and slightly diverging toward the end. Discoidal cell very long, the anterior cross vein placed before its middle; second basal cell a little shorter than the anal cell; the basal section of the fourth interrupted before its end; anal cell rather acute on the lower angle, its terminal vein being oblique; last section of the fifth longitudinal vein much shorter than the perfectly straight and perpendicular hind cross vein.

MINDANAO, Butuan (*Baker*).

198. *Stylogaster bakeri* sp. nov.

This new species is a very important addition to the oriental fauna, being the first species of this genus known from the Orient. It is named in honor of Professor Baker. It seems to be allied to the recently described *S. frontalis* Kröber, 1914, from Belgian Congo; but it is distinct from that and from any other at present known by the peculiar brush of hairs at the base of the hind femora in the male.

Male and female.—Length of body (without antennæ and without ovipositor), 6.5 to 7.5 millimeters; of wings, 6 to 6.5. Head broader than the thorax, of almost circular outline in front view; occiput flat, a little hollowed above behind the vertex, black, densely gray-dusted, with few whitish hairs and a row of short, bristly white hairs at some distance from the eye border. Eyes reddish brown, about two and a half times higher than broad in profile, with the central interior areolets much dilated; frons much narrower than an eye, a little narrowed from vertex to antennæ, pale yellowish opaque, with a very broad shining black ocellar plate, which with its obtuse fore angle is in contact with the lunula, leaving free only a narrow line on sides at

the vertex; ocelli placed near the base of this plate, but a little removed from the vertical keel; in the female the frons is distinctly narrower than in the male and entirely occupied by the shining black plate. Face pale yellowish, white-shining, much narrower than the frons, strongly raised toward the middle, in the shape of a longitudinal keel, entirely bare; jowls rather prominent, colored like the face; mouth opening triangular; chin short, with whitish hairs. Proboscis thin, much longer than body when exserted, black, with narrowly yellow base and broadly yellow end of lips; no distinct palpi; antennæ porrect, first joint very short, whitish, bare; second joint reddish yellow, longer than the first, produced in a lobe on inner side of the third, with short black hairs; third joint reddish yellow, darkened along the upper border, about as long as the first two joints together, broad, obtuse at end with a rather thick, subapical, bare black arista, the two basal joints of which are small but distinct. Of cephalic bristles there is only one pair of strong, long, black, parallel or slightly converging, inner verticals; the sides of frons near the base have two or three short, bristly black hairs directed forward; the rest of the frons is quite bare like the ocellar plate.

Mesonotum subquadrate, as long as broad, strongly convex, dark yellowish, red, or black, with two approximate, longitudinal brown stripes which are prolonged behind a little over the middle and with two broader but less distinct stripes on sides not prolonged over the suture in front; pleuræ and breast pale yellowish, almost whitish; humeral calli rounded, very prominent, pale yellowish. Dorsum clothed with short and scanty black hairs; bristles black, long, and strong; three posterior notopleurals, approximate; three to five supra-alars; one dorsocentral near the scutellum; one very long and strong pteropleural. Scutellum small, convex, rounded, reddish brown above, yellowish on sides and below, with one apical pair of long, diverging black bristles. Postscutellum convex, prominent, dark brownish in the middle; mesophragma narrow, yellowish. Squamæ yellowish, with black border; halteres yellowish. Abdomen elongate, with parallel sides, a little narrower than, and about three times as long as, the thorax; entirely reddish yellow, rather shining, the hind borders of segments two to five with a blackish transverse band above, which is not prolonged to the sides. Second segment on sides with five or six long, bristly black hairs, the rest with short black hairs; venter pale yellow. Male genitalia subglobose, yellow, with two brown spots above near the base, shining yellow below and with some short black ap-

pendages; in middle there are two long pale yellowish cerci with short black hairs; the last abdominal sternite is in the shape of a prominent, obtuse pale yellowish point, directed forward. Ovipositor as long as the abdomen, strongly compressed, with the first segment yellow, the second black.

Legs long, the four anterior tarsi longer than their tibiae; hind legs distinctly stronger than the others, with rather thickened femora; the four front pairs and their coxae entirely pale yellowish, with the last three tarsal joints blackish; coxae with some short and pale yellowish hairs. Hind legs with swollen reddish brown coxae; femora yellowish, with a more or less broad brown ring near the middle; tibiae and tarsi black, the tibiae with a broad whitish ring below the middle. In the male the hind femora have on the inner side near the base a conspicuous brush formed by some rows of rather long black hairs, the ends of which are curved below.

Wings dark grayish hyaline, strongly iridescent with black veins. Venation normal; the first posterior cell rather broad, the bend of the fourth longitudinal vein being rounded but strong.

Luzon, Laguna, Mount Maquiling (*Baker*).

199. *Hippobosca equina* Linn. 1758.

Luzon, Rizal, Alabang (*Mitzmain*). This is the first time that this common insect is recorded from the extreme Orient; it has been imported into Australia and into some of the Polynesian Islands. Probably a recent introduction in the Philippines.

200. *Hippobosca maculata* Leach. 1817.

Luzon, Rizal, Alabang (*Mitzmain*). This species is common in India and Ceylon and is probably spread over the entire Oriental Region.

ILLUSTRATIONS

PLATE I

- FIG. 1. Head of *Schizella furcicornis* g. et sp. nov., from above $\times 27$.
2. Wing of *Tylopterna monstrosum* g. et sp. nov.; a, the spine of the
underside. About $\times 23$.

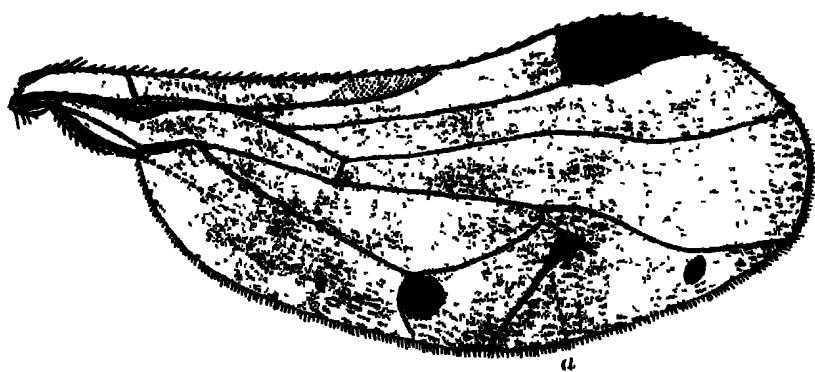
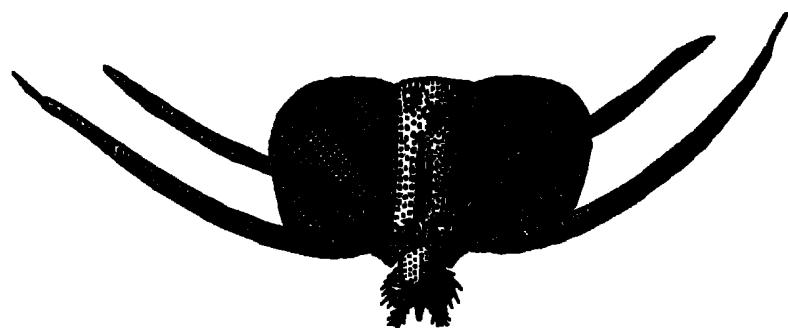


Fig. 2 Wing of *Tylopterna monstrosum* g. et sp. nov., a. the spine of the underside
About $\times 23$.

PHILIPPINE AND ASIATIC PSYLLIDÆ

By D. L. CRAWFORD
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Since my last paper on Psyllidæ of the Orient¹ was written, several small collections have been received from Professor C. F. Baker, that most indefatigable collector. Another collection of considerable interest, from the Pusa Research Institute, includes specimens from various parts of India and Ceylon, accumulated by Mr. T. B. Fletcher. In the former collection are two new genera and several very interesting new species. In the latter collection there is only one new species, but the collection is a valuable one in that new distribution records are established for known species.

Pauropsylla brevicephala sp. nov. Plate I, fig. 11.

Length of body, 1.3 millimeters; length of forewing, 2.0; width, 0.9; width of head, 0.65. General color brown with orange or yellow markings on dorsum and pleurum of thorax; antennæ mostly light brown, apex black; wings hyaline with five black marginal spots, one at end of each of four furcal veins and of radius. Body medium to small, robust. Dorsum of head and thorax shagreened.

Head not as broad as thorax, very short, much deflexed so that it appears to be situated almost beneath the prothorax. Vertex much broader than long, uniformly rounded forward and downward, front ocellus beneath. Genæ scarcely swollen; labrum not very large. Antennæ very short, not as long as width of vertex between eyes.

Thorax strongly arched, broad. Legs short. Wings a little more than twice as long as broad, hyaline and very slightly fumate, rounded at apex, venation somewhat resembling that of *Paurocephala psylloptera*.

Abdomen short. Female genital segment small, short; dorsal valve with a rounded hirsute hump midway dorsad and the apex acute and curved upward; ventral valve very small and its apex turned downward.

MINDANAO, Davao (*Baker*), 2 females.

¹ *This Journal, Sec. D* (1915), 10, 257-289.

Homotoma bilineata sp. nov. Plate I, fig. 1.

Length of body, 2.3 millimeters; length of forewing, 2.9; width, 1.2; width of head, 0.67. General color black; forewings hyaline with two prominent black stripes joined at base and diverging in a V-shape.

Head short, as broad as thorax, deeply cleft in front, with eyes large and prominent; vertex about twice as broad as long, shining black and sparsely hairy; genæ very slightly swollen, but not wholly covering frons; antennæ not quite as long as body without wings, nearly four times as long as width of head, very thick and conspicuously hairy, with several very finely serrated carinæ on each segment; two basal segments large and thick.

Thorax not arched, relatively narrow and not robust, sparsely covered with long hairs. Legs moderately thick, but not very long. Forewings rhomboidal in shape, about two and a half times as long as broad, hyaline, with a black spot in clavus and a black stripe beginning at base of basal vein, dividing at junction point of cubitus and media into two stripes and the two extending and diverging toward apex of wing.

Abdomen long and slender. Male genital segment relatively small; forceps arched, about as long as anal valve, broadest subapically, and rounded at tip, somewhat hairy.

Luzon, Laguna, Mount Maquiling (Baker), 1 male.

In general aspects this species resembles *Homotoma pacifica* Crawford; but in the shorter antennæ, in wing shape, and in wing markings it is quite distinct.

Genus CARSIDAROIDA novum

Head much less deeply cleft in front than in *Carsidara*; vertex large, more or less quadrate, flattened; genæ covering frons and meeting vertex above antennal bases, with anterior ocellus at junction point and appearing to be in middle of vertex because of obscurity of suture between vertex and genæ; genæ swollen beneath antennal sockets, but without genal cones. Antennæ long and slender. Labium very long and slender and prominent.

Thorax not much arched, broad; pronotum long. Legs long and large; hind tibiae with a spur at base and spines at apex. Forewings long, venation similar to that of species of *Carsidara*; with a callus (pseudovein) connecting medial and radial veins as in *Tenaphalara* and in *Carsidara*.

Type of genus: *Carsidaroida heterocephala* sp. nov.

Although this species differs from species of *Carsidara* in having the head less cleft in front, yet the position of the anterior

ocellus, the shape and the venation of the wing, the armed hind legs, the long labium, and the swollen genæ all point to a close affinity with the subfamily Carsidarinæ and, especially, with the genus *Carsidara*.

Carsidarcoida heterocephala sp. nov. Plate I, fig. 7.

Length of body, 2.6 millimeters; length of forewing, 4.8; width, 1.7; width of head, 0.8. General color brownish; thorax with alternating orange and brown or blackish stripes; head light brown or with a yellowish tinge; eyes black; abdomen darker than thorax. Body large.

Head not as broad as thorax, scarcely deflexed; vertex relatively small, more than half as long as broad, with a conspicuously raised margin extending between vertex and each eye and along posterior margin, but the posterior ocelli outside of this elevated rim; within the rim the vertex is rather flat, presenting the appearance of a saucer with perpendicular sides; front ocellus situated a little anterior of the center of this saucer, at obscure junction point of vertex and genæ. Genæ produced in front into a pair of very large, diverging, antennal sockets to the ends of which the antennæ attach, without genal cones except two exceedingly small ones far back under head just in front of labrum; antennal-socket enlargements of genæ very large and prominent beneath head, extending back toward labrum as a pair of parallel half-cylinders. Antennæ not quite as long as body without wings, nearly four times as long as width of head with eyes, slender, black at tip. Eyes relatively large. Labium very long.

Thorax large, not strongly arched; pronotum with a small epiphysis in front at center; legs long, rather large; hind tibæ with a large spur at base and five large black spines at apex, one larger than the other four; other tibæ with a fine comb of slender spines at apex. Forewings long, about three times as long as broad, hyaline with a faint smoky tinge, with several brown or black spots scattered about in apical portion; pterostigma rather large; with a callus (pseudovein) connecting radius and media and another connecting the radius and pterostigmal vein.

Abdomen very long and slender, tapering gradually to genital segment. Male genital segment rather small; anal valve with a broad, apically rounded erect portion and a horizontal prolongation, triangular in shape, reaching backward; forceps as long as anal valve, curved inward and forward, broadly rounded at apex; with a second and smaller pair of forceps cephalad of principal

pair. Female genital segment about one third as long as rest of abdomen, acutely pointed at apex, dorsal valve a little longer than ventral.

Luzon, Benguet, Baguio (*Baker*), 1 male and 1 female.

Rhinopsylla distincta sp. nov. Plate I, fig. 6.

Length of body, 2.9 millimeters; length of forewing, 4.8; width, 1.8; width of head, 0.7. General color light reddish brown to brown; eyes dark; parts of dorsum reddish; antennæ brown.

Head nearly as broad as thorax, scarcely deflexed, deeply cleft in front, covered sparsely with long hairs; posterior ocelli conspicuously elevated. Genæ swollen beneath into a pair of blunt processes (genal cones) projecting vertically downward and situated far back under the head near labrum. In some of the other species of this genus the genæ are swollen, but not into conical processes as in this species. Antennæ very slender, four times as long as width of head, large at base.

Thorax not broad, scarcely arched; pronotum short and much depressed below level of head and mesonotum; legs long, rather slender, hairy; hind tibiæ with a spur at base. Forewings very long, reaching more than half their length beyond abdomen, hyaline, acute at apex; first marginal cell larger than second.

Abdomen slender, rather small. Female genital segment about as long as rest of abdomen, both valves tapering to an acute end, the dorsal valve a little longer than ventral, sparsely hairy.

Luzon, Benguet, Baguio (*Baker*), 1 female.

Genus *STROGYLOCEPHALA* novum

Head short, not deflexed, very uniformly rounded in front, the eyes and vertex together forming almost a hemisphere; ocelli not elevated; frons not wholly covered by genæ, visible as a small sclerite between genæ with front ocellus at its apex; genæ not swollen into cones; labrum small; labium short. Antennæ short, a little longer than width of head. Thorax not arched; pronotum relatively long and with præscutum forming somewhat of a "neck." Legs short and not large. Forewings slender, acute at apex, with pterostigma.

Type of genus: *Strogylocephala fascipennis* sp. nov.

This genus is a member of the subfamily Pauropsyllinæ resembling *Pauropsylla* in some head characters, as the visible frons and rounded vertex, but differing from most others of this subfamily in the unarched thorax and slender wings. In the latter characters there is some resemblance to the Carsidarinæ. The aspect of the type species is suggestive of *Tenaphalara*.

Strogylocephala fascipennis sp. nov. Plate I, fig. 12.

Length of body, 1.3 millimeters; length of forewing, 1.8; width, 0.55; width of head, 0.4. General color dark brown or reddish; abdomen light brown; legs and antennæ yellow, the latter black at tip; wings with a brown band along posterior margin. Body small, slender.

Head almost hemispherical, not deflexed; vertex roundly convex, without depressions, finely punctate, posterior ocelli not elevated. Frons a narrow sclerite about one half to one third as broad as long. Genæ not at all swollen, except at attachment of antennæ and there only a little swollen, covering basal portion of frons. Antennæ about one half longer than width of head, slender, with rather long, terminal setæ.

Thorax scarcely elevated, not broad. Legs short, not armed. Forewings nearly three times as long as broad, very slender, acutely pointed, with first marginal cell very small; a broken and irregular brown band extends along posterior margin from base to apex, usually with a break about midway.

Abdomen slender. Male genital segment small; forceps short, small, almost as long as anal valve, inner surface toothed, pointed at apex, outer surface arcuate; anal valve small, erect, simple. Female genital segment small and short; dorsal valve rounded apically with a sharp, pointed prolongation at end; ventral valve shorter, more acute at apex.

Luzon, Laguna, Los Baños (Baker), 2 males and 1 female.

Epipsylla forcipata sp. nov. Plate I, fig. 2.

Length of body, 2.8 millimeters; length of forewing, 3.4; width, 1.3; width of head, 0.84. General color light orange to lemon yellow; eyes and tips of antennæ black. Body a little larger than that of *Epipsylla pulchra* and lighter colored, without the conspicuous notal stripes of the latter.

Head not quite as broad as thorax, somewhat deflexed; vertex about three fourths as long as broad between eyes, with two large, shallow depressions between ocelli; front ocellus visible from above. Genal cones very long and slender, about one third longer than vertex, very little or not at all divergent, subacute. Antennæ about as long as body without wings, seldom longer, slender.

Thorax not strongly arched, broad; pronotum long, flat. Hind tibæ with small spur at base and four back spines at apex. Wings hyaline, with an orange tinge, acutely rounded at apex, about two and one-half times as long as broad, pterostigma present.

Abdomen moderately long, not large. Male anal valve a little broader than forceps, truncate at apex with a slender prolongation reaching upward and backward toward forceps. Forceps as long as anal valve, stout, arched, with a row of about six black spines at apex and about six or seven on inner surface near apex pointing backward and interlocking with the corresponding spines of the opposite side; these are apparently a great aid in holding the female genital segment during copulation. Female genital segment nearly as long as the remainder of abdomen, tapering to the subacute apex; dorsal valve a little longer than ventral.

PALAWAN, Puerto Princesa (*Baker*), 3 males and 5 females.

Epipsylla pulchra Crawford.²

The female genital segment, not described in the original description of the species, is very similar to that of *E. forcipata*.

Luzon, Benguet, Baguio (*Baker*), 3 males and 2 females.

Euphalerus citri (Kuwayama). = *Diaphorina citri* Kuw.

Euphalerus citri (KUWAYAMA), CRAWFORD, Rec. Ind. Mus. (1912), 7, 424, Pl. 85, fig. D.

This is a widely distributed species throughout the Orient, from India through China to the Philippines. Additional specimens are before me now showing some slight variations from the typical forms in wing coloration—as might well be expected in such a widely distributed species—collected at Coimbatore, South India, by "T. V. R." on *Cardia*, August 4, 1913; others from the same locality on August 22, 1913, collected by "C. N." on *Cardia cardata*; others collected at Poona, Bombay, by T. B. Fletcher, Sept. 8, 1911.

Arytaina variabilis sp. nov. Plate I, fig. 3.

Length of body, 2.1 millimeters; length of forewing, 2.4; width, 1.3; width of head, 0.85. General color greenish yellow; eyes black; wings darker, with a brown apical and anterior, marginal band sometimes with darker spots scattered through the band. Body very robust, surface covered with stiff pubescence.

Head nearly or quite as broad as thorax, rather strongly deflexed. Vertex a little more than half as long as broad, surface irregular, with a transverse depression between posterior ocelli and from there roundly convex and sloping downward toward front ocellus; posterior ocelli scarcely elevated; anterior ocellus

² *This Journal, Sec. D* (1913), 8, 297.

easily visible from above. Genal cones large and broad, not divergent, rounded at apex, continuing in same plane with vertex, but separated therefrom by a deep furrow, about as long as breadth at base, with short stiff pubescence. Antennæ about as long as body without wings, very slender.

Thorax broad and robust, hairy. Legs short and stout; hind tibiae with spur at base. Forewings broad, scarcely twice as long as broad, membrane scarcely hyaline, apex broadly rounded or a little angulate, veins setose; a darker band, often with black spots scattered through it, extends from first cubital vein around apex of wing to base of pterostigma; central portion light brown; second marginal cell differing in shape among individuals of the species.

Abdomen relatively short and thick. Male genital segment moderately large; forceps large, broad, spatulate, very broad at apex, apical margin rounded, broadly and finely toothed; anal valve longer than forceps, tapering to a small end. Female genital segment not as long as rest of abdomen, much smaller, tapering to acute end, dorsal valve a little longer than ventral.

MINDANAO, Butuan (*Baker*), 1 male; Davao (*Baker*), 1 male; LUZON, Tayabas, Malinao (*Baker*), 1 female. A fourth specimen, a female, from Mount Banahao, Laguna, Luzon (*Baker*), shows the venational characteristics of the Butuan male, but is destitute of the wing coloration present in all the other specimens. Whether this is a constant variation—a subspecies—or a chance individual not wholly developed is impossible to judge from the one specimen at hand. It appears that in this species there is a considerable variation in wing color and body color and in minor venational characters.

Arytaina tuberculata sp. nov. Plate I, fig. 8.

Length of body, 3.8 millimeters; length of forewing, 3.5; width, 1.8; width of head, 1.0. General color orange to tawny brown; eyes black; abdomen dark brown; antennæ dark over apical half; wings brownish. Body large, robust, surface covered with short, stiff pubescence.

Head nearly as broad as thorax, large, strongly deflexed. Vertex large, about half as long as breadth between eyes, each half roughly triangular in shape with the two discal depressions meeting at midline and forming one larger cavity, with a prominent wartlike tubercle on each side between posterior ocellus and antennal base; posterior ocelli elevated; anterior ocellus in notched front margin of vertex. Genal cones large, as long

as or slightly longer than basal width, extending forward in same plane with vertex, but separated therefrom by a deep furrow; broadly rounded at apex, a little divergent, hairy. Antennae nearly as long as body without wings.

Thorax broad and large, strongly arched, hairy. Pronotum long. Legs large and stout; hind tibiae with a prominent spur at base and the apical spines large. Forewings broad, about half as wide as long, light brownish and partially transparent, rounded broadly at apex; veins not setigerous.

Abdomen large, short. Female genital segment not as long as rest of abdomen, much smaller, acute at apex, dorsal valve a little longer than ventral.

MINDANAO, Davao (*Baker*), 1 female.

Arytaina punctipennis Crawford.

Psyllopa punctipennis CRAWFORD, Rec. Ind. Mus. (1912), 7, 481.
Pl. 34, figs. K, O, Pl. 35, fig. U.

This interesting species was described originally as a *Psyllopa*, but this genus has subsequently been merged by the author with the older genus *Arytaina*. This species is a pest of indigo in the Orient and probably is the same as Buckton's *Psylla isitis*, but this identity has not been fully established. Several specimens are before me from Peradeniya, Ceylon, collected by T. B. Fletcher on *Indigofera*, April 14-17, 1914.

Psylla colorada sp. nov. Plate I, fig. 13.

Length of body, 1.6 millimeters; length of forewing, 2.1; width, 0.87; width of head, 0.55. General color bright red throughout, except antennal tips and eyes brown or black.

Head about as broad as thorax, well deflexed. Vertex about half as long as broad; posterior ocelli elevated on small pedicels; genal cones a little longer than vertex, strongly divergent, narrowly rounded at apex, sparsely clothed with long hairs. Antennae scarcely two and one-half times as long as width of head, slender.

Thorax strongly arched. Legs small. Forewings hyaline, veins reddish, membrane uncolored; pterostigma rather large. Abdomen short. Male genital segment short, small; forceps spatulate, truncate, somewhat toothed at apex, arched; anal valve a little longer than forceps, long and narrow in profile, tapering to apex.

Luzon, Laguna, Mount Maquiling (*Baker*), 5 males.

This species resembles somewhat *Psylla coccinea* Kuwayama,

of Japan, but differs in head characters of some importance as well as in coloration, although both species are bright red in general color.

Psylla crenata sp. nov. Plate I, fig. 9.

Length of body, 3.0 millimeters; length of forewing, 3.6; width, 1.5; width of head, 1.1. General color dark brown, with light brown patches on vertex and both thoracic and abdominal dorsum; wings with yellowish tinge and a prominent dark band on apical margin. Body large and very robust.

Head large and broad, but not quite as broad as thorax, strongly deflexed. Vertex about half as long as broad, each half strongly triangular, converging toward front ocellus, posterior ocelli large and somewhat elevated; between each posterior ocellus and antennal base is a wartlike prominence. Genae very large, prominent around antennal bases and conspicuous between vertex and eyes; genal cones large, as long as vertex, a little divergent, subacute at apex, pubescent. Antennæ very long and slender, fully as long as entire body to tip of wings or about four times as long as width of head.

Thorax very broad and large, strongly arched; pronotum sinuate or crenate on dorsal surface, with three rounded convexities. Legs large, hairy; hind tibiae with a prominent spur at base. Forewings large, broad, broadly rounded at apex, with a broad brown or black band with indefinite margin extending around apex of wing from tip of claval suture to middle of radial cell; membrane of wing fumate or light brown.

Abdomen very large. Female genital segment large, as long as or longer than rest of abdomen, converging to acute apex, dorsal valve longer than ventral.

MINDANAO, Butuan (*Baker*), 1 female.

Trioza eugeniooides sp. nov. ✓

Length of body, 1.9 millimeters; length of forewing, 3.8; width, 1.4; width of head, 0.7. General color brown to dark brown, with lighter tawny stripes along dorsum and patches of the same color on pleura and abdomen.

MINDANAO, Butuan (*Baker*), 3 females; no data on food habits given.

The general appearance and structure are similar to *Trioza eugeniae* Crawford¹ and *Trioza ariatica* Crawford,² but the

¹ *This Journal, Sec. D* (1915), 10, 265, Pl. I, fig. e, 266.

species differs from both in color, wing venation, and a few other characters. These differences may be summarized as follows:

1. Thorax smooth, shining, black; wings very narrow, about three times as long as broad; second marginal cell about twice as long as greatest width; fourth furcal ($M_1 + 2$) terminating in wing apex; male anal valve almost quadrate; genal cones about one third as long as vertex.
Triozza asiatica Crawf.
2. Thorax punctate or rugulose, not smooth; light green or yellowish green; wings about three times as long as broad; second marginal cell about two and one-half times as long as greatest width; fourth furcal ($M_1 + 2$), extending to apex or near it. Male anal valve triangular. Genal cones half as long as vertex.
Triozza eugeniae Crawf.
3. Thorax punctate and brown with light stripes and blotches; wings about two and three-fourths times as long as broad; second marginal cell only a little longer than greatest width; fourth furcal ($M_1 + 2$) terminating in front of apex with apex within second marginal cell. Genal cones strongly decurrent, fully one half as long as vertex or more.
Triozza eugenicoides sp. nov.

All three of these species are probably gall-forming, as mentioned in the paper cited in the footnote. One very large female in the collection, from Mount Banahao, Luzon (*Baker*), seems to belong to a fourth species of this group, but I am deferring its description until more specimens appear.

Triozza divisa sp. nov. Plate I, fig. 5.

Length of body, 2.1 millimeters; length of forewing, 3.7; width, 1.5; width of head, 0.8. One half black and one half light; head, thorax, base of abdomen, and legs dark brown or black; caudal half of abdomen white; basal third of wings black, remainder hyaline, the hyaline portion beginning at the white portion of abdomen, thus dividing insect into anterior dark half and posterior light half. Body robust; surface covered with long slender hairs.

Head strongly deflexed, not as broad as thorax. Vertex distinctly longer than half its width, somewhat irregularly convex, sparsely covered with long hairs, posterior ocelli not elevated. Genal cones nearly as long as vertex, extending nearly parallel to plane of vertex but below it. Eyes large. Antennae about one and one-half times as long as width of head, whitish except black at tip, with several very long hairs on each segment.

Thorax robust, broad, large, arched; pronotum short and depressed. Legs hairy, rather stout; hind tibiae with small spur at base and three thick spines at apex. Forewings about two and

one-half times as long as broad, black and opaque on basal third, hyaline or slightly fumate on remainder; veins with very long hairs; with a tendency toward a cubital petiole, but otherwise not related to *Ceropsylla*.

Abdomen (of male) very short. Male genital segment small and whitish or yellow; anal valve small, hood-shaped, profile narrow and longer than forceps, subacute at apex; forceps relatively broad, arched, apex truncate.

Luzon, Benguet, Baguio (Baker), 2 males.

Triosa lusonensis sp. nov. Plate I, fig. 10.

Length of body, 2.3 millimeters; length of forewing, 3.2; width, 1.3; width of head, 0.75. General color light orange to reddish or to yellowish; apical third of antennæ black. Body surface sparsely hairy.

Head not much deflexed; vertex fully half as long as broad, with a prominent elevation at each posterior ocellus and a prominent convexity on each side of median line, with a deep sulcus between each ocellus and medial convexity. Genal cones small, scarcely half as long as vertex, divergent, rounded or subacute, well below plane of vertex. Antennæ a little more than twice as long as width of head.

Thorax well arched. Legs somewhat hairy. Forewings hyaline, with setigerous veins. Male genital segment moderately large; anal valve large, triangular in profile, with posterior angle acute; forceps about as long as anal valve, slender, arched, acute at apex. Female genital segment less than half as long as rest of abdomen, both valves acute and about equal in length.

Luzon, Laguna, Mount Maquiling (Baker), 1 male and 4 females; Benguet, Baguio (Baker), 1 male.

Triosa fletcheri Crawford.

Triosa fletcheri CRAWFORD, Rec. Ind. Mus. (1912), 7, 434, Pl. 34, fig. V, Pl. 35, fig. Q.

Two imperfect specimens from Coimbatore, South India, seem to belong to this species, though it is impossible to make any conclusive statement because of the poor condition of the specimens. They were collected by "Y. R." in galls of *Trewia* sp., December 9, 1913.

Triosa jambolanae sp. nov. Plate I, fig. 4. ✓

Length of body, 2.0 millimeters; length of forewing, 3.5; width, 1.4; width of head, 0.8. General color reddish brown, abdomen

darker; antennæ and legs a little lighter brown; antennæ black at tip.

Head not quite as broad as thorax, deflexed. Vertex about half as long as broad, with a deep furrow down median line and a convexity on each side and a deep furrow on each side of these convexities and the much elevated posterior ocelli. Genal cones as long as vertex, divergent, somewhat decurrent, hairy, subacute. Antennæ about one and one-half times as long as width of head, slender.

Thorax well arched, broad; pronotum short, depressed. Forewings about two and one-half times as long as broad, hyaline, with a black spot in middle of clavus, rather acute at apex.

Abdomen large. Female genital segment very short, dorsal valve longer than ventral, both acute.

BENGAL, Pusa' (*C. S. Misra*), 2 females, on *Eugenia jambolana*, Feb. 3, 1915.

Type specimen deposited in British Museum, London.

ILLUSTRATIONS

PLATE I. FOREWINGS OF NEW PSYLLIDAE

- FIG. 1. *Homotoma bilineata* sp. nov.
2. *Epipeylla forcipata* sp. nov.
3. *Arytaina variabilis* sp. nov.
4. *Trioza jambolanæ* sp. nov. ✓
5. *Trioza divisa* sp. nov.
6. *Rhinopsylla distincta* sp. nov.
7. *Careidaroidea heterocephala* g. et sp. nov.
8. *Arytaina tuberculata* sp. nov.
9. *Prylla crenata* sp. nov.
10. *Trioza luzonensis* sp. nov.
11. *Pauropsylla brevicephala* sp. nov.
12. *Strogylocephala fascipennia* g. et sp. nov.
13. *Prylla colorada* sp. nov.

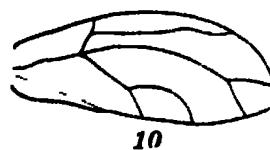
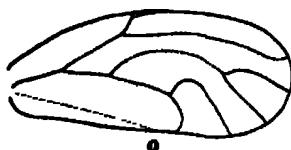
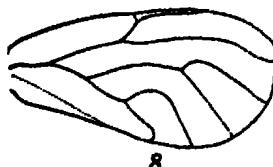
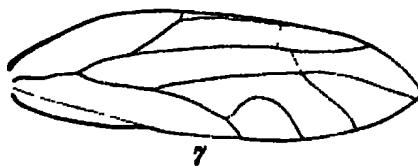
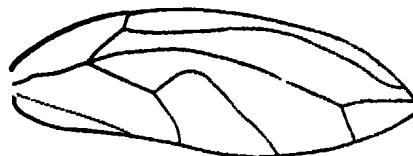
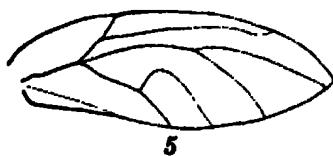
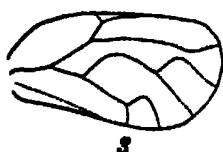
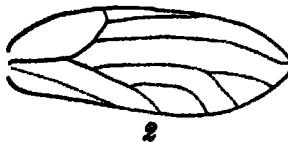


PLATE I. FOREWINGS OF NEW PSYLLIDÆ.

THE MOSQUITO FISH, GAMBUSIA AFFINIS (BAIRD AND GIRARD), IN THE PHILIPPINE ISLANDS

By ALVIN SEALE

(From the Section of Fisheries, Biological Laboratory,
Bureau of Science, Manila)

In 1905 I was commissioned by the Hawaiian Government to secure and transport to the Hawaiian Islands a shipment of fish that would live in areas infested by mosquitoes and feed on the larvae and eggs of these pests.

At that time practically nothing was known regarding any species that might fill these requirements, nor was it known if such a fish, when found, could be successfully transported a great distance. Helpful suggestions were received from various friends, and I proceeded to Seabrook, Texas, to look for the desired fishes.

At that place I noticed a number of small top-minnows, or killifishes, feeding on mosquito larvae. An examination was made of the stomach contents of several species in order to ascertain which had eaten the greatest number of mosquitoes. This resulted in *Gambusia affinis* being selected, and there has been no reason to regret the choice. This species is now known throughout the Orient as the "mosquito fish."

About 400 specimens of this species were transported in ordinary 10-gallon milk cans and landed at Honolulu September 15, 1905. When the fish were liberated in small breeding ponds, which were stocked with mosquito larvae, they at once made a vigorous attack upon these pests, suggesting a pack of wolves ravaging a flock of helpless sheep.

Two years later Dr. D. L. Van Dine, entomologist for the Hawaiian Government, wrote as follows regarding these fish:¹

They have multiplied rapidly and from the few hundred introduced, several hundred thousand have been bred and distributed. Where they occur they effectively clear the water of mosquito larvae, feeding likewise on the eggmasses of *Culex pipiens* on the surface.

At the present time (1916) there are millions of these fish in the Hawaiian Islands, and two men of the health department

¹ Press Bull. Hawaii Agr. Exp. Sta. (1907), No. 20, 10.

are kept busy distributing them to various parts of the Islands. The decrease in the number of mosquitoes is very noticeable, and the Governor of the Islands writes:

The top-minnows have been a decided success. Where ponds have swarmed with larvae of mosquitoes, the top-minnows have entirely cleaned them out in a few days.

Letters from other persons in the Islands have been to the same effect.

When returning to the Philippine Islands from the United States in 1913 I secured two dozen mosquito fish at Honolulu, placed them in a glass jar in my stateroom, and brought them to Manila. The offspring of these fish now number many thousands and are being widely distributed throughout the Philippine Islands and the Orient, as will be seen in the following report.²

DESCRIPTION OF THE MOSQUITO FISH

The mosquito fish, *Gambusia affinis* (Baird and Girard), is very small. The female when full-grown is about 5 centimeters (2 inches) in length; the male is smaller. The general color is light olive, with the belly silvery. The female has a distinct blackish spot on each side of the belly. There is one small fin on the back (dorsal) which has seven rays, three fins on the belly (ventrals and anal), and one fin on each side (pectorals).

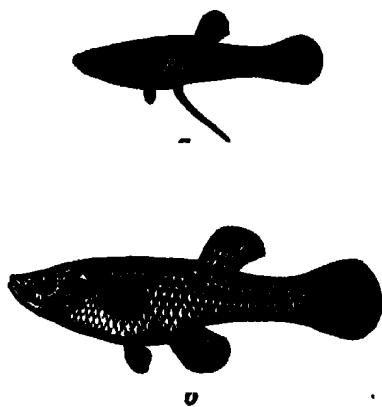


FIG. 1 Top minnow, or mosquito fish, *Gambusia affinis* Baird and Girard. a, male. b, female. About actual size.

In this species the sex is easily distinguished by the shape of the anal fin; in the male this fin is long and slender and the anterior rays are modified to form an intromittent organ. In the female the anal fin is large and normal in shape, with ten rays. The mouth is small. The eye is large. These fish usually swim near the top of the water. It seems to matter very little whether the water is fresh or brackish, clear or muddy, warm or cold. They thrive in all sorts of places.

²An additional shipment of mosquito fish was ordered from Honolulu, but the fish received proved to be *Melanotaenia latipinnis*, and so were not liberated.

BIRTH OF THE YOUNG FISH

The mosquito fish does not lay eggs, but gives birth to fully formed and very active young. The exact procedure of each parent in this important function is given below, being described from observations of the actions of a half-grown female mosquito fish, length, 34 millimeters, and of a young male, length, 28 millimeters, which were placed in a small glass jar on my study table where they could be observed perfectly. Observations began December 8, 1915.

As soon as the male saw the female, he became greatly excited, as was indicated in the swift change of color to a beautiful opalescent blue on the head and the sides. He at once made swift dashes at the female, and acted as if he intended to bite her on the lower abdomen. He made no attempt to copulate with her. The female strongly resented these actions and tried to escape. The male continued the swift dashes and attacks upon the female for ten minutes. The female finally became quiet near the bottom of the jar and gave birth instantly to a young fish, which came out head first and shot to the surface of the water, where it swam about vigorously.

The male fish in the meantime had become perfectly quiet, resting about 2 centimeters directly behind the female. His great interest and excitement, however, were well shown in the rapid working of his gills, the quick vibration of his caudal fin, and the beautiful play of iridescent blue over his body.

As soon as the young fish was born the female swam away, but she was again vigorously and continuously attacked by the male until she again became quiet and gave birth to another fish. This one appeared tail first and was delivered with great difficulty. The operation lasted eight minutes. During this time the female left her position repeatedly, but each time was driven back by the male, who exhibited the most intense excitement, except when the female became quiet and attended strictly to her business, at which time he also became quiet and refrained from any attack upon her.

This female gave birth to 21 young fish, all but 2 coming into the world head first, which may be assumed as their normal manner of birth. The time consumed in the entire operation was twenty-five minutes.

Within one hour after the young were born, the mother made a fierce attack upon her offspring and succeeded in catching and eating two. These were hard to catch, and I believe that in

an unconfined space they could almost always escape. The male took no part in this canibalistic feast.

The female was then removed to a separate jar, and the male was left alone with the young for twenty-four hours without food. He showed absolutely no disposition to attack or eat the young, although he must have been very hungry.

In old females the young shoot out without difficulty, and I have seen them give birth to five young in as many seconds. The first instinct of the young fish is to get away from the vicinity of its parents, but after swimming about for a few minutes, it settles upon the bottom or upon the leaves of the pond weeds to rest.

COPULATION AND PERIOD OF GESTATION

The following day (December 9, 1915) this male was again placed in the jar with this female. It was at once apparent that the relation between the two had entirely changed, for the female at once attacked the male and bit him viciously and chased him about the jar. The male very evidently was afraid of her. However, this did not prevent the male from making repeated successful attempts to copulate with the female. These attempts were always made by stealth and without the consent of the female.

The exact method of copulation was as follows: The male would get behind and a little below the female; then if she was not watching he would suddenly dart forward, at the same time turning forward the large modified anal fin, which functions as an intromittent organ, and would attempt to insert this organ in the cloaca of the female, who would at once turn and fiercely attack her would-be mate. These exchanges continued irregularly for about three days and were gradually given over by the male.

Eight weeks later (February 3, 1916) this female showed decided signs of pregnancy, and three weeks later (February 25, 1916) the male was seen to be making passes at the female and biting at her lower abdomen. He seemed to have lost all fear of her, while apparently she sought only to escape. This change of attitude of the sexes seems to be an unfailing sign that the spawning time has arrived. In one hour this female gave birth to 48 young. The methods followed and the actions of the adult fish were the same as previously described for this pair of fish on December 8, 1915. This second spawning establishes the fact that the period of gestation for this species is not more than seventy-nine days. During this period this pair of fish ate 5,041 mosquito larvae by actual count.

On April 6, 1916, forty-three days after the last spawning, this female gave birth to 49 young.

During this spawning the male fish was removed to another jar. The young fish were born without difficulty and in record time. Therefore, while it might seem that the presence of the male was essential to the spawning, it is evidently not so. This female was kept under close observation for six months, during which time she gave birth to six broods of young as follows:

TABLE I.—Number of young and dates of six broods of mosquito fish.
Total, 253 fish in less than six months.

Young.
21

EMBRYOLOGY

The embryology and morphology of the reproductive organs of the mosquito fish have been worked out by Kuntz,³ and a brief summary of his paper follows.

The ovary of *Gambusia affinis* is a paired tubular organ without a distinct median wall, which opens directly into the urogenital sinus. Each ovum is contained in a separate cellular follicle in which fertilization takes place and the embryo is developed. At the completion of development the ovarian follicles, which are attached to the central rachis by a slender stalk, are ruptured and the young fish are extruded directly through the urogenital aperture.

The modified anal fin of the male, which functions as an intromittent organ, is controlled by a powerful muscle, which is inserted on the proximal end of the anal fin rays and has its origin on a bony process projecting ventrally from the fourth to the last abdominal vertebra, and the modified haemal spines of the first three caudal vertebrae. The third, fourth, and fifth rays of the anal fin are enlarged, greatly elongated, curved, and bear short spines on the distal portion. The interhaemal, which articulates with the third ray, is enlarged and joins with the two anterior processes on which the muscles controlling the anal fin has its origin.

The testis, like the ovary, is a paired tubular organ. The spermatozoa are contained in the spermatophores and are probably transmitted from the male to the female in these bodies.

The formation of the blastoderm and the differentiation of the embryo take place in the manner that is quite typical for all the bony fishes.

³ Kuntz, Albert, *Bull. U. S. Bur. Fisheries* (1913), 33, 181-189.

As development advances, the ovarian follicles become highly vascular, increase in size, and fill with a transparent fluid in which the embryo is constantly bathed. This fluid is aerated by follicular circulation. The gills of the developing embryo become functional comparatively early. During the later stages of the intro-ovarian life, rythmical breathing movements of the embryo can be observed.

The young are born in an advanced stage of development and show nearly all of the diagnostic characters of the species. They undergo no marked metamorphic changes after birth.

RATE OF GROWTH AND FEEDING HABITS OF THE MOSQUITO FISH

The young fish when born is from 3 to 5 millimeters in length, is very active, and begins to feed soon after leaving the mother.

From the brood of 21 fish, previously mentioned as born on December 8, 1915, two were selected and placed in balanced aquaria. Each of these measured 5 millimeters at the time and were 21 hours old. Ten very young mosquito larvae were selected by means of a pipette and placed in each aquarium with the young fish. I saw one of these fish, while less than a day old, catch and eat 8 of these mosquito larvae in less than five minutes. The next day 40 larvae were added to each aquarium. The fish were not able to handle the adult larval mosquitoes as yet, although one fish was observed to catch a big larva by its head, the larvae being fully as long as the fish. There was a fierce struggle in which the fish was thrown from side to side; however, it hung on and in the end succeeding in killing the larva.

A careful count was made of all the mosquito larvae fed to each of the young fish, a net being placed over the aquaria so that should any of the mosquitoes become adult they could not escaped.

On February 8, 1916, exactly two months after their birth, the fish were carefully measured. I was able to distinguish at this time that one was a male and the other a female. The male was 20 millimeters in length, the female was only 19 millimeters. The male had gained 15 millimeters and the female but 14 millimeters during the first eight weeks of their life. During this period the male ate 886 mosquito larvae; the female ate 825.

Two weeks later, March 22, the male was 23 millimeters in length and had eaten 1,663 mosquito larvae. The female was 26 millimeters in length and had eaten 1,547 mosquito larvae.

When the fish were 10 weeks old, the male was placed in the aquarium with the female. He at once copulated with her.

She seemed greatly astonished and settled to the bottom, apparently to keep the male away, but he at once chased her and copulated with her repeatedly. After three hours the male was replaced in his own aquarium.

Eighteen days later, April 8, the male died. At that time he was 4 months old, measured 25 millimeters in length, and had eaten 3,520 mosquito larvae. The young female at that date measured 33 millimeters and had eaten 3,929 mosquito larvae. This fish showed decided signs of pregnancy, and on April 21 she gave birth to six young, which completed the cycle and made the original female we started with a grandmother in the short period of four months and thirteen days. Thirty days is probably the normal period of gestation for this species, and it matures, sexually, in from three to five months.

An experiment was made to ascertain the comparative value of the common goldfish and the mosquito fish in mosquito destruction. A goldfish was placed in an aquarium that contained 1 liter of water and 500 mosquito larvae, and an adult mosquito fish was placed in a similar aquarium containing the same amount of water and the same number of mosquito larvae. At the end of twelve hours the goldfish was dead and there were still left 273 larvae in its jar, the fish having eaten 227 larvae. The mosquito fish was still alive and well and at the end of twenty-four hours had eaten the entire 500 larvae and was ready for more. The chief difficulty in the use of goldfish lies in the fact that, if they can get vegetation to eat, they neglect the mosquitoes. The mosquito fish not only will not feed on vegetation, but actually prefer the mosquitoes as shown by the following experiment.

Twenty live mosquito larvae were mixed with an equal number of larval water boatmen of about the same size as the larval mosquitoes and were fed to a pair of mosquito fish in aquarium A. All of the mosquito larvae were eaten greedily, while none of the water boatmen were eaten until eight hours later and it was the following day before all of them had been devoured. This experiment was repeated, using the young of dragon-flies and mosquito larvae. While the preference was not so marked in this case, it was quite evident that the mosquito larvae were the favorite food.

EXPERIMENTS WITH MOSQUITO FISH UNDER NATURAL CONDITIONS

While the facts recorded in the previous pages may be interesting and illustrate what mosquito fish will do in aquaria, they

cannot be regarded as conclusive, as the fish might act very differently under natural conditions. Therefore the following experiments conducted in open ponds are probably of greater value.

Located near the Bureau of Science are five fresh-water ponds used for fish cultural work. They range in size from 2 by 12 to 29 by 39 meters and from 0.5 to 1 meter in depth. Grass and sedges grow along the margins.

Two hundred mosquito fish were placed in the large pond. This pond was already well stocked with adult black bass, *Micropodus salmonoides* Linnaeus and also contained a number of native fishes, such as *dalag* (*Ophiocephalus striatus* Bloch) and *ayungin* (*Therapon argenteus* Cuvier and Valenciens). The object of the experiment was to ascertain if mosquito fish could maintain themselves and multiply in a body of water stocked with these voracious fishes.

The results have been most satisfactory, for the mosquito fish not only maintained themselves and kept the pond free from mosquitoes, but during the past two years have increased to many thousands. Two thousand five hundred mosquito fish have been taken from this pond and planted in streams and swamps in the vicinity of Manila, without making any appreciable inroad on the supply.

One of the small ponds, kept as a control without any mosquito fish, soon became infested with larvae.

From the original stock of 24 mosquito fish, brought to Manila in 1912, the Bureau of Science has distributed over 7,610 mosquito fish in the streams and swamps of the Philippines. While the fish are as yet too few to make any appreciable difference in the number of mosquitoes, there can be but little doubt that in a few years they will materially decrease the number of these pests and greatly assist in eliminating malaria from the Islands.

SHORT REVIEWS OF THE LITERATURE ON MOSQUITO DESTRUCTION EXAMINED BY THE AUTHOR

HOWARD, LELAND OSSIAN. Notes on the mosquitoes of the United States giving some account of their structure and biology, with remarks on remedies. *Bull. U. S. Dept. Agr., Div. Ent.* new. ser. (1900), No. 25.

This publication gives an account of the structure, life histories, and distribution of the mosquitoes of the United States and Alaska. Various methods for the destruction of these pests are given. The author recommends the introduction of fishes into their breeding places.

IDEM. Mosquitoes; how they live; how they carry disease; how they are classified; how they may be destroyed. New York, McClure, Phillips & Co. (1902).

In this work Doctor Howard writes, "By far the most effective natural enemy of the mosquito larvae and pupae are fish." Among the fishes mentioned are top-minnows, sticklebacks, and sunfish. Regarding the mosquito-fish (*Gambusia affinis*) he quotes Dr. H. F. Moore, of the United States Bureau of Fisheries, as follows: "It feeds largely on vegetable matter but also on insects." Moore is undoubtedly misinformed on this subject, as I have examined hundreds of stomachs of *Gambusia affinis* and have kept individuals of this species under close observation for more than two years, but have never seen the slightest indication that they would feed on vegetation even under the starvation test. Doctor Howard also lists the western salamander (*Diemytulus*), dragon-flies, predatory aquatic insects, and tadpoles as active enemies of the mosquito.

IDE^M. Remedies and preventives against mosquitoes. *Farm. Bull. U. S. Dept. Agr.* (1911), No. 444.

Gives a list of protective liquids and recommends: Oil of citronella, 1 ounce; spirits of camphor, 1 ounce; oil of cedar, 1 ounce. This paper also gives methods of screening, smudging, and fumigating, recommending for this purpose pyrethrum powder. The irritation caused by the bite of the mosquito may be relieved by applying a cake of moist soap to the bite. In regard to the destruction of mosquito larvae by natural enemies, this paper contains the following statement: "The common goldfish and silverfish destroy mosquito larvae and should be put in artificial ponds. Top-minnows of several species have been introduced successfully in several localities and are great feeders upon mosquito larvae. Certain species introduced from Texas into Hawaii have been successful; and a small top-minnow of the genus *Girardinus*, known in the Barbados as 'millions,' has been carried with success to others of the British West India Islands. In Rio de Janeiro another top-minnow has been used by the public health service for placing in tanks and boxes where it was impossible to use petroleum."

IDE^M. Some facts about malaria. *Farm. Bull. U. S. Dept. Agr.* (1911), No. 450.

Contains descriptions and figures of the malarial mosquitoes. Suggests that protection may be secured by the use of nets, by screening, and by the destruction of mosquitoes. Quininization of people in malarial districts is also suggested.

KUNTZ, ALBERT. Notes on the habits, morphology of the reproductive organs, and embryology of the viviparous fish *Gambusia affinis*. *Bull. U. S. Bur. Fish.* (1913), 33, Doc. No. 806.

This is an excellent paper on the mosquito fish

LEPRINCE, JOSEPH ALBERT AUGUSTIN. Impounded waters. A study of such waters on the Coosa River in Shelby, Chilton, Talladega, and Coosa Counties, Ala., to determine the extent to which they affect the production of anophelines, and of the particular conditions which increase or decrease their propagation. Reprint No. 257 from the *U. S. Public Health Reports* (1915), 30.

A study of certain impounded waters in Alabama that were found to contain malarial and other mosquitoes. The débris, floating pine needles, branches, and logs were found to furnish resting and breeding places for the larvae of *Anopheles*. Regarding the destruction of these by natural enemies, LePrince states (p. 11): "Where small top-feeding minnows are present in numbers in the absence of débris, the number of *Anopheles* larvae found at

the sides of floating logs are few, and they are frequently absent in such localities. The scarcity of small fish in the lake during the present year is the reason why many larvae and pupae of *Anopheles punctipennis* were present at some of the inlets examined." This scarcity of top-minnows was due to the presence of large predatory fishes. In Shraders Mill Pond, which is well stocked with top-feeding minnows, but which otherwise is ideal for the production of mosquitoes, there being plenty of floating pine needles and débris, no mosquito larvae were found. "The top-feeding minnows were apparently able to dispose and did dispose of all larvae and prevented development of *Anopheles* in this area." (p. 9.)

ITEM. Control of malaria. Oiling as an antimosquito measure. Reprint "No. 260 from the U. S. Public Health Reports (1915), 30.

Comments on the value of oil as used in the fight against mosquitoes and says, "Oiling was largely used in maintaining the force of 50,000 men on the Isthmus of Panama sufficiently free from malaria to construct the canal."

LUDLOW, CLARA SOUTHMAYD. Disease-bearing mosquitoes of North and Central America, the West Indies, and the Philippine Islands. *Bull. U. S. Army Med. Dept.* (1913), No. 4. [Imprint dated 1914.]

This paper gives descriptions and figures of the mosquitoes found in the above regions. Certain desirable lines of investigation are suggested, and as a remedy for these pests, ditching, filling, cleaning, and larvicides are recommended. The introduction of mosquito fish (top-minnows) into ponds and open basins of water is urged.

ROSS, EDWARD HALFORD. The reduction of the domestic mosquitoes. Instructions for the use of municipalities, town councils, health officers, sanitary inspectors, and residents in warm climates. London, J. Murray (1911).

This writer gives the results of his experience gained as health officer at Port Said and in the Suez Canal district. The book contains valuable suggestions.

SEAL, WILLIAM P. Fishes in their relation to the mosquito problem. *Bull. U. S. Bur. Fish.* (1910), 28, 831-38.

This author advocates the use of several kinds of fishes, such as, top-minnows of several species, sunfish, goldfish, the roach, and the pirate perch. Regarding the mosquito fish, *Gambusia affinis*, he says: "As a destroyer of *Anopheles* the writer has for several years advocated the use of *Gambusia affinis*." [See also *Proc. Biol. Soc. Washington* (1911), 24, 91.]

SEWELL, R. B. NEWMOUR, and CHAUDHURI, B. L. Indian fish of proved utility as mosquito-destroyers. Calcutta, Printed by order of the Trustees of the Indian Museum . . . (1912).

This paper gives a list of ten Indian fishes that are regarded as of value in the destruction of mosquito larvae. These fishes are of the following genera: *Haplochilus*, *Lebias*, *Ambassis*, *Trichogaster*, *Badis*, *Anabas*, *Barbus*, and *Nuria*.

STILES, CHARLES WARDELL. Mosquitoes and malaria. Report on a short trip in eastern North Carolina. Reprint No. 217 from the *U. S. Public Health Reports* (1914), 29.

An account of the locations in which malarial mosquitoes were found, with a list of the species collected.

TOWER, WINTHROP VOSE. A study of mosquitoes in San Juan, Porto Rico.
Circular Porto Rico Agr. Exp. Sta. (1912), No. 14.

This paper gives a list of the mosquitoes of Porto Rico, their breeding places, the methods followed in mosquito work, and the ordinances recommended with the view of ridding the city of the pest. Ordinance D was as follows (p. 19) : "All water in fountains shall be treated with oil or with mosquito feeding fish." Regarding the destruction of mosquitoes by natural enemies this paper states (p. 7) : "A number of fish have been under observation, being kept in a large tank. They are very fond of mosquito larvae and have been seen eating the egg masses of the common house mosquito of the Tropics. The presence of these fish in streams may account for the scarcity of the malarial bearing mosquitoes and therefore the small amount of malaria on the island."

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ILLUSTRATION

TEXT FIGURE

FIG. 1. Top-minnow, or mosquito fish, *Gambusia affinis* (Baird and Girard).
a, male; b, female. (Redrawn in the Bureau of Science from
Press Bulletin No. 20, Hawaii Agricultural Experiment Station,
after the United States Fish Commission.)

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SEA PRODUCTS OF MINDANAO AND SULU, III: SPONGES, TORTOISE SHELL, CORALS, AND TREPANG

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FOUR PLATES

SPONGE FISHERIES

There are several good sponge beds in the Sulu Archipelago, and as there has been but little prospecting for sponges, it is probable that many beds remain to be discovered among the numerous islands that constitute the southern part of the Philippine Islands.

LOCATION OF THE PHILIPPINE SPONGE BEDS

The Sitanki beds.—In 1907 two Americans, Messrs. Johnson and Byersdoff, discovered near Sitanki Island the first bed of commercial sponges known in the Philippine Islands. They shipped to markets in the United States and Europe about 3,000 kilograms of sponges.

These beds are in shallow water and practically cover the great Sitanki reef. Several varieties of grass sponges are exceedingly abundant on these beds, and a canoe load can be gathered in an hour. These are fragile and of little value. On the edge of the reef in deeper water a much better kind of sponge is found. This is a variety of wool sponge, which I have named the Sulu Sea bath sponge. It is a large, tough-fibered, coarse sponge and is unknown to the American trade, there being nothing like it on the Florida or the Bahama beds. It is excellent for ordinary work about boats or stables and for persons

who like a vigorous bath. I have found that it will outlast the ordinary Florida wool sponge for such uses. All of the sponges from these beds have been secured by wading or by employing naked Moro divers, who were not very familiar with sponges. It is probable that if these beds were properly prospected with a diving outfit sponges of greater value would be found.

The Tawi Tawi beds.—The Tawi Tawi sponge beds are scattered over a wide area. The great majority of the numerous reefs and islets near Tawi Tawi Island have sponges of various kinds growing about them. The reef surrounding Tijitiji Islets and extending as far north as Bilatan is a prolific portion of this bed. At Banaran, Secundum, Latuan, Tundubas, South Ubian, and Kinapusan Islands some very good sheep's-wool sponges have been secured. The deeper waters about these islands have not been prospected with diving outfits. A sponging concession at Kinapusan Island was granted to Mr. Bruen for the Philippine Sponge Company in December, 1915. I have examined some excellent sheep's-wool sponges taken from this concession. A peculiar sheep's-wool sponge that is dark red on the inside is taken in the channel between Latuan and Mantabuan Islands.

Sponging operations on the Tawi Tawi beds consist in hiring Moros to wade over the reefs and gather shallow-water sponges in baskets. They are paid very little for their work, and most of the sponges they secure are fragile and of a very inferior grade. Sponges taken from deeper water are of much greater value.

The Siasi beds.—The first genuine sheep's-wool sponge found in the Philippines was secured by me at Sitanki Island in 1907. Some years later this sponge was shown to Doctor Moore, sponge expert of the United States Bureau of Fisheries, and he pronounced it "an imported Florida wool sponge." More than 1,000 kilograms of the same or a better grade of sheep's-wool were taken from the Philippine beds during 1915. Siasi is the operating center of the Philippine Sponge Company, of which Mr. McGrath, of Manila, is president. The field operations are directed by four Americans, who are without previous experience in sponging. They have expended about 25,000 pesos.¹ Their plant consists of storehouses, cleaning vats, corrals, boats, and wharf. They have exported 3,080 kilograms of sponges with a declared customs value of 48,000 pesos.

¹One peso Philippine currency equals 100 centavos, equals 50 cents United States currency.

I understand that a large portion of these sponges were shallow-water varieties gathered by the Moros wading on the reef. A much better grade of sponges could be secured in water of from 5 to 10 fathoms. An excellent grade of sheep's-wool sponge can be secured on the Siasi beds.

Basilan beds.—There are extensive beds of elephant's-ear sponges on the reefs of Bihintinusa Island, south of Basilan; at Takela and Tengolan Islands; and near the lighthouse on Malamaui Island. There has been very little systematic prospecting of the Basilan sponge beds, and our knowledge of them is very fragmentary.

Zamboanga beds.—The Zamboanga sponge beds were discovered by the Greek diver on the Bureau of Science sponge boat leased for a short time during the present investigation. This bed is in water from 5 to 20 fathoms deep and extends from near the mouth of Honda River seaward into deeper water, then northward to a point offshore from the constabulary quarters. The sponges on this bed are honeycomb wool of a good grade and a thick, tough elephant's-ear. This bed has never been worked and would repay exploitation.

Sacol Island beds.—The Sacol Island beds, which are located in from 6 to 18 fathoms of water on the southwest side of Sacol Island, were discovered by a company of eight experienced Greek spongiers, of which Mr. P. I. Pipinos is the head. This company has secured 800 kilograms of sponges from this bed, all of the honeycomb wool variety and of excellent size and grade.

VARIETIES AND VALUES OF PHILIPPINE SPONGES

There are three well-marked classes of commercial sponges found in the Philippines. These are the wool, the grass, and the elephant's-ear. Of the wool sponges the following varieties occur:

The sheep's-wool sponge.—This sponge (Plate II, fig. 4) is in every respect similar and equal to the well-known sheep's-wool sponge of Florida and grows to the same size. I have examined specimens 20 centimeters in diameter, although the average size is much less. This sponge has a strong, soft, elastic fiber. It is found in large quantities on the Tawi Tawi and the Siasi beds and grows best in water of from 6 to 10 fathoms. It is valued at from 10 to 30 pesos per kilogram.

The honeycomb sponge.—The honeycomb sponge (Plate II, fig. 3) is a variety of wool sponge with a somewhat coarser fiber than the sheep's-wool and with the canals resembling honey-

comb. It is a strong sponge and for ordinary use is very servicable. It holds water well, is elastic, and is very durable. This sponge is known only from the Sacol and the Zamboanga beds, where it is abundant in waters of from 6 to 18 fathoms. The experienced Greek spongers pronounced this an excellent sponge and have exported several hundred kilograms; quotations received were 5 pesos per kilogram.

The Sulu Sea bath sponge.—The Sulu Sea bath sponge (Plate II, fig. 2) is another variety of the wool sponge. It has an extremely long, coarse fiber and is probably the most durable sponge found in Philippine waters. I have been using sponges of this kind for the last eight years and find them most satisfactory. This sponge is only known from the Sitanki beds. It is little known to the American trade, and I am unable to give any quotations of value.

Philippine zimocca sponge.—There is considerable doubt as to the classification of the Philippine zimocca sponge (Plate II, fig. 5), which is unknown to the American trade. Some experts say that it is intermediate between the wool and the grass sponges, while some experienced spongers say that it is most nearly related to the European zimocca. It is very tough and has a fine, closely knit fiber. It is usually flat and measures from 15 to 20 centimeters in diameter. It is found on the Tawi Tawi, the Sitanki, and the Siasi beds on rocky bottom and in shallow water. It is not very abundant; the only quotations received placed its value at from 6 to 10 pesos per kilogram.

The following varieties of the grass sponge of commercial value occur in Philippine waters:

The common grass sponge.—The common grass sponge (Plate II, fig. 6) is a soft-textured, moderately fragile, nicely shaped sponge from 20 to 30 centimeters in diameter. The best grades of this sponge are found in water of from 3 to 5 fathoms. It is common on the reefs of practically all the sponge beds. The best selected grades of this sponge are worth from 2 to 6 pesos per kilogram.

The Philippine reef sponge, or glove sponge.—This is a variety of grass sponge. It is a very soft and beautiful sponge, but unfortunately it is fragile and, therefore, can be used only a short time. It is found in shallow water on almost all reefs in the Sulu Archipelago. It is of little commercial value.

The Philippine silk sponge.—This is a small variety of grass sponge with a beautiful, soft, silky texture. It is usually from 10 to 15 centimeters in diameter and may be the young of the

common grass sponge. It is not so fragile as the ordinary reef sponge.

Elephant's-ear sponges.—Of the elephant's-ear, or cup, sponge there seem to be but two varieties in the Philippines. One of these is a very fragile, shallow-water form of very thin, rough texture, of white or greenish color, and of no value. The other is the genuine commercial elephant's-ear similar in all respects to the elephant's-ear found in the Mediterranean Sea. This sponge is pink when fresh from the water; the walls are soft and very tough and are from 1 to 1.5 centimeters thick. The valuable variety of elephant's-ear sponge is found only in water of from 6 to 20 fathoms and is very common on the Basilan, the Zamboanga, and the Sacol beds. It is also probably common on other beds, but no deep-water divers have yet prospected for it in other places.

Mr. P. I. Pipinos, of the Greek Sponge Company operating from Zamboanga, who is an experienced Mediterranean sponge dealer, has cured and exported these sponges, and he pronounces them equal to the elephant's-ear of the Mediterranean. This sponge is practically unknown to the American trade. Mr. Pipinos gives its value at about 24 pesos per kilogram. The market is wholly European.

This sponge is used for the most expensive grades of padding for helmets, racing saddles, etc. It is also used by glaziers in finishing their products.

OCCURRENCE AND GROWTH OF SPONGES

Commercial sponges in their natural state have very little resemblance to the cured and bleached specimens seen in the druggist's window. When first taken from the water, sponges are soft, slimy, irregular, and unattractive. In color they are black, brown, gray, or green.

The living sponge is covered with a thin skin, and its body is traversed by irregular canals, which open to the surface by large pores. Usually there are many fragments of coral, shell, and other foreign material embedded in the sponge body.

Sponges grow best on a sandy bottom that is well overgrown with eelgrass or algae. On a rocky bottom they are apt to be of poor shape. Sponges are hermaphroditic and reproduce by two methods: namely, by budding and sexually. After fertilization the eggs rapidly attain the free-swimming stage and are expelled from the body, and are carried far and wide by the tides. After a short period they settle to the bottom, attach

themselves to rocks or shells, and grow. A sponge attains marketable size within two or three years.

Sponges have been successfully cultivated in several countries, the method being as follows: The sponge is held under sea water and with a sharp knife is cut into suitable pieces, usually from 5 to 10 centimeters square. It is best not to remove the sponge from the water at any time. The cuttings are strung on rattan, bamboo, or copper or tin wire, or are fastened to a smooth tile or to a cement base, and are replaced in a convenient bed in the sea and left to grow. They should be planted in the same depth of water as their original home, as sponges from deep water do not grow well in shallow water, and those from shallow water do not thrive in deep water. The Australian Government has experimented with sponge growing for six years with considerable success, and some experiments have been conducted by the United States Bureau of Fisheries on the Florida beds.

METHODS OF CURING, GRADING, AND MARKETING SPONGES

There are several methods of preparing sponges for the market, and the treatment must be adapted to the class of sponge; for example, the fragile grass sponge should not be given the same treatment as the tough Sulu Sea bath or the honeycomb sponge.

The experienced Greek spongers, who conducted their work with a 5-ton boat equipped with diving outfit, air pump, and crew of six men, used the following method in handling their wool sponges: As soon as caught, the sponges were placed right side up on deck; after four or five hours they were trampled by the feet and strung on strong cords about 2 meters in length. These strings of sponges were hung over the sides of the boat in the water. As time would permit within the next twenty-four hours, a string at a time was taken on deck and squeezed and washed again, until the skin and other soft organic matter were removed. The clean sponges were hung in the rigging to dry, after which they were stored on board until the boat came in from her cruise. As soon as the sponges were landed, they were spread out in the warehouse and were carefully gone over one by one, all of them being beaten with a smooth, rounded club against a solid log to remove all shells, sand, and other foreign matter. The sponges were next passed to the trimmers, who trimmed them into good shapes with sheep shears. After this

the sponges were sorted into grade and sizes, thoroughly dried, baled into sacks, and stored until shipped.

This method has the advantage that the sponges are allowed to remain in the water only a short time after being gathered and so are not rotted as is often the case when sponges are placed in corrals. The elephant's-ear sponges were treated in the same manner, but were not pounded and so required less time to clean.

The common method of cleaning sponges—a necessary one where great quantities of sponges are handled—is as follows: The sponges are gathered and placed upright on shore until dead—from a few hours to a day usually being required. They are then placed in a bamboo corral, which is built in shallow water. The corral should have a bottom of bamboo, boards, or rocks to keep the sponges off the ground. The sides should be of stakes, wire net, or bamboo, so that the water can circulate freely over the sponges. The attendant must go over the sponges continually, squeezing out the dead matter and cleaning them. Some spongers leave the sponges in this corral two or three days, but I am convinced that this is too long and rots the tissues. The sponges should be cleaned as soon as possible. If they remain but a few hours in the water, so much the better for the sponges; in fact, the fragile reef and grass sponges should be washed out at once. If these instructions are followed, a more durable quality of grass sponge will result. When clean the sponges should be beaten with a smooth, rounded club, and all shell, coral, and sand should be removed. They should then be trimmed, sorted, graded, and thoroughly dried, after which they may be packed and shipped. Sponges should at all times be kept off the ground; otherwise they rot. They also heat and rot if left uncleaned in a boat for several days. A boat working more than one day distant from the corrals should follow the Greek method of curing on ship board. If sponges are left in water or are exposed to rain, they turn red or bright yellow and rot. Lack of care in handling and cleaning has gone far toward spoiling the American market for Philippine sponges, as can be seen by the following letter from a large wholesale house in Chicago:

The small silk sponge which is very close grain and soft is taken from water which is so shallow that the sponge falls to pieces when being bleached and is practically of no value. We also have something which looks like a Sheepswool sponge but it is not properly cleaned, the sponge life still remains in the sponge making it heavy. Now, if your people would

fish in 20 or 30 feet of water, trim their sponges with shears until they are smooth all around, sort them into bales in accordance with size, packing goods about as follows: 1 to 3, 3 to 6, 6 to 10, 10 to 16 and 16 to 20 pieces to the pound and separate the different grades and varieties, we would then be able to handle them to much better advantage. Labor is quite an item on these goods over here but of course it would not amount to so much there.

The whole perfect sponge is called a "form," those with crab holes and other imperfections are called "seconds," while cut pieces are known as "cuts." The sizes are named from the number of pieces required to make up a pound, being "ones, twos, 2-3, 3-4, 4-6, 6-8, 8-10, 10-12, 12-16, 16-20." Rings through which the sponges are passed are sometimes used to determine the exact sizes.

I would advise the following method in grading sponges, which is employed in the sponge fisheries of the United States: Sort as to kinds—these may be sheep's-wool, honeycomb wool, zimocca, Sulu Sea bath, grass, or elephant's-ear—and pack according to sizes. Select a reliable house to handle the goods in the American or foreign markets. There has been much complaint among the Philippine spongers that their goods are not handled in a satisfactory manner by American sponge houses, but it can scarcely be expected that an American sponge house with a large stock of Florida and Bahama sponges on hand will exert much effort in marketing Philippine sponges, unless there is some special reason for such exertion.

RECENT SPONGING ACTIVITY

During an inspection trip to the southern islands in December, 1915, considerable new information regarding the Philippine sponge fisheries was secured.

The Philippine Sponge Company had entered the field and expended about 20,000 pesos on a plant for the proper cleaning, curing, and storing of sponges, and had shipped 2,000 kilograms of sponges to the United States market—chiefly sheep's-wool.

A company under the direction of Mr. Pipinos, an experienced sponger, was operating successfully with diving outfits in the waters near Zamboanga. In waters of from 10 to 14 fathoms it secured about 1,800 kilograms of an excellent grade of honeycomb and elephant's-ear sponges. Several individuals were engaged in gathering from the reefs quantities of shallow-water sponges of no great value.

At the request of Governor Carpenter, a bill was drafted for the proper regulation and control of the sponge fisheries. This act was passed and became effective February 5, 1916.

THIRD PHILIPPINE LEGISLATURE.

Fourth session.

A. B. No. 1571.

[No. 2584.]

AN ACT REGULATING SPONGE FISHERIES IN THE PHILIPPINE ISLANDS.

By authority of the United States, be it enacted by the Philippine Legislature, that:

SECTION 1. Except as provided in this Act, it shall be unlawful to fish, collect, or gather sponges from the sea bottom or reefs within a radius of three marine leagues from any land within the territorial limits of the Philippine Islands.

SEC. 2. The Secretary of the Interior may grant concessions for the fishing for, collecting or gathering of sponges in any waters of the Philippine Islands, to the following:

- (a) Citizens of the United States or of the Philippine Islands.
- (b) Honorably discharged soldiers or sailors of the Army or Navy of the United States.
- (c) Corporations duly organized under the laws of the Philippine Islands.
- (d) Persons who have under and by virtue of the Treaty of Paris acquired the political rights of natives of the Philippine Islands.

SEC. 3. All applications for concessions shall be made to the Secretary of the Interior and be accompanied by a description giving latitude and longitude indicated upon a chart of the region desired, the latest published charts of the United States Geodetic Survey being taken as the basis of the plot. Such applicants must take oath in proper form that the said area does not conflict in any way with any concession already granted or occupied. If the Secretary of the Interior should become satisfied of the financial responsibility of the applicant, the concession may be granted, subject to the proper erection and location of marks and buoys. All concessions must be marked at each corner with properly anchored buoys, and in shallow water, description of boundary marks must be submitted.

All persons working under a concession or permit must at all times carry in their possession copy of such concession or permit ready to exhibit the same upon demand by any peace officer or other persons designated by the Secretary of the Interior to enforce the provisions of this Act.

SEC. 4. The annual concession fee shall be twenty-five pesos per square kilometer. Concessions granted in accordance with this Act shall be for the sponging privilege exclusively, shall run for a period of not to exceed ten years, and shall not interfere with the free passage over the area under concession of boats or vessels, nor in any way prevent the unrestricted fishing, by other persons over the said area, for marine forms other than sponges: *Provided, however,* That, subject to confirmation by the Secretary of the Interior, the Director of Education or his authorized representatives may select from any concession, without charge, adequate areas of foreshore and waters for the cultivation of sponges or other marine forms for the purpose of any government school or schools located on or adjacent to any concession.

SEC. 5. The Collector of Internal Revenue shall collect the fees and charges fixed by virtue of the provisions of this Act. The annual con-

cession fees shall be due on the first of January of each year and, if tendered in quarterly installments, on or before the twentieth of January, April, July, and October, or on or before the last day of said months in remote provinces, in the discretion of the Collector of Internal Revenue, shall be received without penalty; but any person first beginning to fish, collect, or gather sponges under a concession, shall pay the first quarterly installment before his concession shall be valid. If the fee due on any concession is not paid within the period in which the payment may be received without penalty, the amount of same shall be increased by ten per centum, the increment to be a part of the fee. Should the concession fee remain delinquent fifty days after the same becomes due, the concession shall be canceled, without prejudice to criminal proceedings against the delinquent concessionaire under section twelve hereof.

Of the sums collected under and by virtue of this Act, twenty per centum shall accrue to the Insular Treasury and forty per centum to the province and municipality, respectively, in which the concession is located. In case a concession should be included within two or more provinces or municipalities, the distribution between the different provinces and municipalities shall be made in proportion to the areas of the concession included within the respective municipalities and provinces as aforesaid.

SEC. 6. A temporary written permit to prospect for sponges in any waters of the Philippine Islands, not under concession, may be granted by any provincial treasurer with the concurrence of and countersigned by the provincial governor, upon payment of a fee of five pesos. This temporary prospector's permit shall not be valid for a longer period of time than three months from date it is issued, and shall not be subject to renewal. Such permit may be issued to any person or corporation subject to the provisions of section two hereof.

Under no circumstances shall more than fifty kilos of cleaned sponges be gathered under such temporary permit. Should any such temporary prospector's permits be found with defaced, erased, or illegible date of issue, they shall be taken up at once by the first peace officer who becomes aware of this fact. At the end of the period for which these temporary prospector's permits are issued, they shall be returned to the issuing treasurers, who shall keep the same on file marked "canceled."

SEC. 7. Holders of a sponge concession shall have the privilege of erecting the necessary plant for the development and exploitation of the sponge industry such as houses, drying racks, corrals, landings, etc., on the shore convenient to the concession for the proper curing of sponges: *Provided, however,* That the previous approval of the Secretary of Commerce and Police should be had in accordance with the provisions of Act Numbered Sixteen hundred and fifty-four before erecting structures herein referred to.

SEC. 8. All sponges shipped from the Philippine Islands shall be graded as to variety and size and such grades must be placed in separate sacks and truthfully marked. It shall be the duty of the Insular Collector of Customs to enforce the provisions of this section in accordance with rules and regulations issued under this Act.

SEC. 9. Under penalty of the forfeiture of the concession and confiscation by the Government of the entire shipment in which found, no commercial sponge of less than ten centimeters through any diameter shall be taken from the waters of the Philippine Islands except for purposes of

sponge culture within Philippine waters. This penalty shall be imposed by the Secretary of the Interior after such investigation as he may deem necessary in each case, without prejudice to any punishment that may be imposed by the Court in accordance with the provisions of section twelve of this Act.

SEC. 10. The Secretary of the Interior is hereby authorized and empowered to make and prescribe, and from time to time to change, such rules and regulations as may be required to carry out the provisions of this Act, other than those fixing the manner for the collection of the fees and charges prescribed hereunder, and otherwise to conserve and promote the sponge industry in the Philippine Islands. Such rules and regulations when approved by the Governor-General shall have the force of law and any violation thereof shall be punished in accordance with the provisions of this Act.

SEC. 11. It is hereby prohibited and declared unlawful:

(a) To transfer any concession or permit granted or issued under the provisions of this Act, except with the consent of the Secretary of the Interior.

(b) To fish, collect, or gather any sponges growing on the sea bottom or reefs within the boundary of a concession occupied by another person, and granted under the provisions of this Act, or by a concessionaire outside the boundary of his concession.

(c) To engage in the practice of "loading" or impregnating sponges with foreign substance of any sort or character whatsoever for the purpose of increasing the apparent weight of said sponges and thereby deceiving purchasers of said sponges as to their true weight.

(d) To ship from or attempt to ship from the Philippine Islands any sponges taken from the waters thereof except through the Customhouse at one of the ports of entry of the Philippine Islands.

(e) To possess Philippine commercial sponges, unless holding a concession or permit in accordance with this Act or a bill of sale traceable from a concessionaire.

(f) To remove, deface, destroy, or in any way interfere with the location marks of any concession granted under the provisions of this Act.

(g) To possess undersized sponges, or sponges less than ten centimeters through any diameter.

(h) To take from the waters of the Philippine Islands any commercial sponge by the use of any dredge or "gáangara" except in waters of more than thirty fathoms in depth.

SEC. 12. Any person violating the provisions of this Act or any regulations issued by the Secretary of the Interior as provided for in this Act shall be punished by a fine of not less than twenty pesos and not more than five hundred pesos for each offense, or by imprisonment not exceeding six months, or by both such fine and imprisonment, in the discretion of the court.

In case any association or corporation shall violate or cause to be violated any provision of this Act, such association or corporation, upon conviction thereof, shall be punished by a fine of not less than one hundred pesos and not more than one thousand pesos for each offense, and any person, member, or employee of any association or corporation who shall violate or cause to be violated any provision of this Act, or shall aid, abet, or assist in such violation, or shall voluntarily permit the same, upon

conviction thereof, shall be punished by a fine not exceeding five hundred pesos for each offense, or by imprisonment not exceeding six months, or by both fine and imprisonment, in the discretion of the court.

SEC. 13. Violations of this Act may be prosecuted in any Court of First Instance of any province, but the court first lawfully taking cognizance thereof shall have jurisdiction of the same to the exclusion of all other courts.

SEC. 14. The Governor-General may, by executive order, designate the Governor of the Department of Mindanao and Sulu to perform the duties and powers devolving upon the Secretary of the Interior under this Act within the territorial limits of said Department.

SEC. 15. Act Numbered Two hundred nine of the former Legislative Council, entitled "An Act for the preservation and regulation of the sponge fisheries of the Moro Province, and for other purposes," is hereby repealed: *Provided, however,* That nothing in this Act provided shall be construed to impair any right or obligation acquired or imposed under the provisions of said Act numbered Two hundred nine for sponge concessions existing at the time of the passage of this Act.

All records carried by the Government of the Department of Mindanao and Sulu under the provisions of said Act Numbered Two hundred nine are hereby transferred to the office of the Secretary of the Interior.

SEC. 16. The provisions of this Act shall not apply to persons gathering sponges outside of the limits of the concessions, provided the daily amount of sponges gathered by them does not exceed five kilograms.

SEC. 17. This Act shall take effect on its passage.

Enacted, February 4, 1916.

TORTOISE SHELL FISHERIES

Amount and value of the shell.—During 1914, 2,296 kilograms of tortoise shell, valued at 34,947 pesos, were exported from the Department of Mindanao and Sulu. The value of the shell depends largely upon the marking and ranges from 4 pesos per kilogram for the small shell to 167 pesos per kilogram for the first grade. It is sold by the catty, which is about equal to 1.4 pounds or 0.63 kilogram. The style in tortoise shell changes frequently; just now dark shell with but few spots is preferred.

Kinds of sea turtles.—There are three species of sea turtles that are of considerable commercial importance in the Philippines. These are the hawksbill, the loggerhead, and the green turtle. The hawksbill produces the thick tortoise shell of commerce. This turtle has a hooked bill, and its back is made up of 13 larger plates, which overlap each other, and 25 smaller plates, which form the margin. The loggerhead turtle also has a hooked bill, but is distinguished by having 15 plates on the back and 27 around the margin. The flesh is usually tainted with a fishy odor. The green turtle has a straight bill, and the plates

of the back are smooth and do not overlap. The green turtle is valued chiefly as food, the shell being thin and of no use except for veneer. Green turtles are very common, easily domesticated, and form a valuable food supply. In Spain an industry of importance consists of canning the meat and soup of the green turtle. Such an industry would be possible in Mindanao.

Breeding places and habits of the sea turtles.—The small outlying islands of the Sulu Archipelago, such as Bancoran, Lumbucan, the Pearl Banks, and several islets near Sibutu, are famous turtle resorts. The turtles come ashore on the sandy beaches to deposit their eggs. At this time they are captured by the turtle hunters. On one small sandy islet I counted twenty-four heads of turtles that had been recently killed.

The food of the hawksbill turtle consists almost exclusively of crabs, shrimps, and mollusks. A specimen that I kept in captivity for one year would not eat fish, dead or alive, under any condition. The green turtle will eat fish to a limited extent, but seems to prefer shellfish and sea weeds. The loggerhead lives exclusively on fish.

The sea turtles thrive in captivity with but little attention. Many of the inclosed lagoons of the Sulu Sea would make ideal turtle farms. Some of the Moros in the vicinity of Siasi and South Ubian capture young turtles and confine them in corrals or in pens until they are adult. This plan could be easily enlarged upon by closing the entrance of a small lagoon, thus forming a turtle farm similar to the famous one on Ascension Island.

Uses for tortoise shell.—The manufacturing of combs, jewel boxes, brush backs, and various ornaments from tortoise shell is an established industry in almost every civilized country. About 8,000 kilograms of tortoise shell valued at 100,000 pesos are gathered in the Philippine Islands each year. A manufacturing establishment to use this supply of shell could be located at Zamboanga or Jolo. Such a factory would require but little capital, probably not over 5,000 pesos. The manufactured articles would have free entry into the United States, thus avoiding the 50 per cent duty.

At the present time practically all Philippine tortoise shell is shipped to Japan, where it is manufacture into combs and other articles, which pay 50 per cent duty into the United States and are sold at a profit.

If private capital is not forthcoming for this work, it might be desirable to send an intelligent student to Japan to work in a tortoise-shell factory and learn the business.

COMMERCIAL CORALS

The most abundant coral in the Archipelago is the common *Porites*, or massive reef-building coral, that forms the greater portion of all reefs. Large blocks of this are sometimes used for building purposes; it is also used in road making and is frequently burned for lime.

Several other genera produce coral used for ornamental purposes, but this has little commercial value. Some of these are *Prolobacia*, which usually grows in the shape of a vase; *Herpetolitha*, which resembles a pickle dish; *Madrepora*, which grows like a great mushroom with its head covered with a crown of spikes; *Caeloria*, the brain coral; *Heliopora*, the blue coral; and *Tubipora*, the beautiful red organ-pipe coral. Two or three small pieces of the precious red coral have been found in this Archipelago, but no systematic search for the bed has ever been made.

The most valuable coral found in these waters is the black coral, *Antipathes abies*. This occurs in two forms; one, called *hay ten* by the Chinese, resembles a coiled wire and is unbranched, the other, called *thie chew* by the Chinese, is branched and when first taken from the water resembles a Christmas tree. It takes a beautiful polish and can be easily straightened by the use of dry heat.

The black coral is found in great abundance directly in front of the town of Jolo in Jolo Channel. It is also found in many other places, especially near Siasi and Sitanki; the principal fishery, however, is at Jolo.

There is a small local market for this coral after it has been made into canes, swagger sticks, and bracelets. China, however, is the principal market. The coral is usually cut into proper lengths for bracelets; these are made into bundles, each containing two dozen pieces. These bundles sell for 5 pesos each. The long sticks, which can be used for canes, sell at the rate of about 24 pesos for thirty sticks. I believe a market for this black coral could be found in Japan or Europe. At present, the amount exported is unimportant.

TREPANG FISHERIES

LOCATION OF PRINCIPAL FISHERIES

There is scarcely a reef or an island in the entire Sulu Archipelago where trepang (*bêche de mer*) does not abound.

The chief fisheries, however, are in the vicinity of Jolo, Siasi, Bongao, and Sitanki, not because there is more trepang near

these islands, but because the Samals, or water Moros, who do most of the fishing, live near these places. There is more trepang in Davao Gulf than in any other place I have visited, but there is no trepang fishery at that place, because there are no fishermen who understand the gathering and preparing of trepang.

The revenues derived from the trepang fisheries could be considerably increased by the spread of a little information that would lead to the opening of additional fisheries and to the improving of the methods of preparation.

This information could be disseminated in the most practical manner through certain schools. The students could be easily taught to recognize, cure, and market the various grades, thus providing a small income for themselves and at the same time improving the quality of the prepared grades of trepang.

Trepang from the Philippine Islands is put on the market in the poorest condition and brings the lowest price of any trepang—almost a third lower than the price obtained for Celebes and Australian trepang, although the species are the same. The need for more careful preparation of this product is obvious.

LOCAL NAMES, VARIETIES, AND VALUES OF TREPANG

Trepang (*Malay, tripang*) is a commercial product consisting of the dried bodies of various species of echinoderms of the family Holothuriidae. The name is also applied to the living animal. Trepang is widely known under the name bêche de mer. The English names for the animal are sea cucumber and cotton-spinner. The Moro name is *bot*. There are many other local names, such as *balat*, *balatan*, *balate namaco*, *hi sam*, and *munsang*.²

There are about sixteen principal varieties and forty-seven commercial grades in the Philippines. In color they range from white to black. Some are smooth; others are covered with prickles. In life their length is from 12.5 to 45 centimeters or more, but when dry they are seldom more than 20 centimeters in length and from 2.5 to 8 centimeters in diameter. When properly cured, they look like a bologna sausage and should be dry enough to "rattle like walnuts in a bag."

Each species of commercial trepang is divided into three grades: namely, large (*toa*), medium (*tiong*), and small (*liow*), with their corresponding values. Thus the three grades of the oh nyeow are *toa oh nyeow sam*, valued at 150 pesos per picul; *tiong oh nyeow sam*, valued at 100 pesos per picul; and *liow oh*

² A check list of Philippine holothurians will be found in *This Journal*, Sec. D (1911), 6, 812.

nyeow sam, valued at 75 pesos per picul. The following commercial varieties and grades are recognized by the merchants in Zamboanga and Jolo:

Oh nyeow sam (*Plate IV, fig. 1*).—Great black trepang, *bot uao* of the Zamboanga Moros. This is a large, comparatively smooth trepang, without prickles or teats. When dry, large specimens measure from 15 to 20 centimeters in length by about 7 centimeters in diameter. They are found on sandy bottoms near reefs in water 15 fathoms or less in depth. This is the most valuable of all Philippine trepang, selling for as much as 1.50 pesos for a single specimen.

Thang nyeow sam (*Plate IV, fig. 3*).—Sandy-bellied black trepang, *bot calang*. This trepang resembles the *oh nyeow sam*, but is easily distinguished by the fact that the belly is roughened as if covered with coarse black sand; the back is also more corrugated and the body more nearly oval than the *oh nyeow sam*. This species is found in shallow water near reefs throughout the Archipelago. It prefers a sandy bottom. The following prices are paid for this trepang: Large (*toa*), 90 pesos per picul; medium (*tiong*), 75 pesos per picul; and small (*liow*), 50 pesos per picul.

Buoy hwah sam (*Plate IV, fig. 2*).—Long-prickled trepang, *bot calang*. It is almost impossible to distinguish this form from the *che sam*, except that it is smaller and the prickles, which cover the entire body except the belly, are longer. The body when dry is black, the prickles are long, and there may be from three to five prickles from one base. The dry specimen is from 4 to 14 centimeters long. This ranks second in value among Philippine trepang, being worth as much as 1 peso a specimen. The following values are quoted for the different grades: Large, 120 pesos per picul; medium, 70 pesos per picul; small, 50 pesos per picul.

Gan sam (*Plate IV, fig. 4*).—Great teat trepang, or great oval brown trepang, *bot bato*. This is one of the commonest Philippine trepang. It is easily distinguished by the two rows of teats on each side of the body. The body wall of this species is very thick. The adults are from 11 to 18 centimeters in length. They live in water from 1 to 10 meters in depth and are most often found among scattered rocks on a sandy bottom. The animals of this variety are always split open, and cross sticks are inserted to facilitate the drying. The large size sells for 70 pesos per picul; medium, 50 pesos per picul; small, 35 pesos per picul.

Oe sam (*Plate IV, fig. 5*).—Great smooth black trepang, *bot*

longa, bot *hunas*. This is a rather common form of trepang throughout the Archipelago. It is black, and the skin is smooth, without teats or prickles. It is more pointed and oval than the oh nyeow sam, which it most nearly resembles. The length of the dried adult is from 5 to 11 centimeters. It is found in comparatively shallow water near the shore on a sandy bottom. In Manila this species is quoted as being the most desirable of all the trepang; the price paid, however, will scarcely bear this out. The large size is valued at 45 pesos per picul; medium, 30 pesos per picul; small, 18 pesos per picul.

Che sam (*Plate IV, fig. 7*).—Great prickle trepang, *moi whar che*, bot *ista*. This trepang closely resembles the buoy hwoh sam, but is considerably larger. It is uniform black when dry, and with the exception of the belly it is entirely covered with long prickles. This is a common form and is found in shallow water near reefs, usually on a sandy bottom. The adults, when dry, are from 6 to 19 centimeters long. In life this species is more or less pink. Its maximum length is about 46 centimeters. It is distinguished by the long prickles, which cover the back and sides and are frequently joined at the base, forming starlike rosettes with from three to five points. Only the most experienced traders can distinguish between this form and the expensive buoy huah sam; therefore trepang with the long black prickles is usually classed as che sam, the value of which is as follows: Large, 45 pesos per picul; medium, 30 pesos per picul; small, 20 pesos per picul.

Ang thoot sam (*Plate IV, fig. 6*).—Smooth red trepang, bot *bantawan*. This is a small, very smooth dull red trepang. It is from 3 to 10 centimeters long. It is very common in shallow water and commands the following prices: Large, 30 pesos per picul; medium, 20 pesos per picul; small, 15 pesos per picul.

Peh thoot sam (*Plate IV, fig. 18*).—White trepang. While this form is of little value, it is important because of its abundance. It lives in shallow water and is gathered by men wading along the reef. It is from 3 to 9 centimeters long and uniform white when dry. Its value is from 7 to 18 pesos per picul.

Twa bing thoot sam (*Plate IV, fig. 15*).—Brown and white trepang. This trepang is found in very shallow water along the reef. It is of medium size—from 3 to 11 centimeters long—and is valued at from 10 to 20 pesos per picul.

Bing thoot sam (*Plate IV, fig. 16*).—Red and white trepang. This small trepang is rather smooth with a slight trace of red; its length is from 2 to 9 centimeters. It is found in shallow water. Its value is from 7 to 14 pesos per picul.

Bah sam, or *che bah sam* (*Plate IV, fig. 8*).—The convoluted trepang, *bot gamat*. This form is light brown, of moderate size, and greatly convoluted when dry. It is found in shallow water and is of comparatively little value, being worth only from 10 to 12 pesos per picul.

Choo bah sam (*Plate IV, fig. 12*).—Also called *bot gamat*. This is a third-class trepang with the skin considerably roughened with spicules. It is of medium size, light brown below, darker above, and is valued at from 7 to 16 pesos per picul, depending chiefly upon the size.

An tiow sam (*Plate IV, fig. 11*).—This is a name often applied to all of the third-grade trepang and includes a number of species. The name, however, is more properly applied to the rough, spiculate brown trepang shown in figs. 10 and 12. This species is very common and is often used to adulterate the shipments of better grades of trepang. Its value is from 8 to 9 pesos per picul.

Thoot sam (*Plate IV, fig. 13*).—The skin of the *thoot sam* is white and is covered with numerous chalky spicules. It is a common shallow-water trepang of the third class and is valued at about 10 pesos per picul.

Thoot ah sam (*Plate IV, fig. 14*).—This is a very small trepang; it is dark or brown above and white below. It is common on almost all reefs in the Sulu Sea and is valued at 8 pesos per picul.

Thang sam (*Plate IV, fig. 9*).—*Bot jadish*. This is a long black trepang, of little value because of its thin body walls. It is used chiefly to adulterate shipments of better grades. It is a very common shallow-water form, valued at from 6 to 10 pesos per picul.

METHODS OF PREPARING TREPANG

Trepang are gathered at low tide. The fisherman usually walks along the reef, carrying a single-pronged spear with which he transfixes the animals. In deeper water it is necessary to dive for them. The best grades are usually in water from 3.5 to 6 meters deep or even deeper. In some places small dredges could be operated with advantage.

After the trepang are gathered, they are taken to the curing station and cared for promptly; otherwise they become a blubber, unsavory mess within a few hours. They are first placed in a pot or caldron of water (an oil tin would answer the purpose) and boiled for twenty minutes (some require less time). When taken out of the boiling water, they should be hard and elastic.

and should dry quickly like a hard-boiled egg. They are slit open with a sharp-pointed knife, and the entrails are removed.¹ They are next placed in the sun and left until almost dry and then transferred to a smoke house and smoked for about twenty-four hours. The smoked trepang are spread on a mat in the sun until perfectly dry. Finally they are packed in bags. Trepang are prone to collect moisture, and if kept for three or four weeks they must be again spread out and dried in the sun to prevent molding. I found that if a small amount of sulphur was burned in the smoke house a short time before the smoking process was finished it prevented this mold from making its appearance for a long time. However, we have yet to learn if the slight sulphur flavor would affect the price.

Numerous complaints have been received from Hongkong and Singapore dealers that the Philippine trepang was not well prepared and that it was for the most part a third-grade product, which brought a third-grade price. The remedy for this lies in following the instructions given above and in securing more of the better varieties of trepang. The Moros do not exercise enough care in curing this product, and as the better varieties are in deep water and more difficult to collect, they are content to gather such trepang as come easily to hand. The Moros cure the trepang by drying and smoking it on a stick thrust through the body of the animal. When scarcely more than half cured, it is offered for sale.

A wholesome soup can be prepared from trepang as follows: Clean, wash, and mince fine; soak in cold water five hours; boil for one hour; add salt, pepper, butter, and some beef or chicken stock. Serve hot or iced.

HABITS AND FOOD OF TREPANG AND THE POSSIBILITIES OF CULTIVATING THEM

Trepang are very sedentary animals, moving very slowly and for but short distances. Some species prefer the lagoons of coral reefs, others live on the sandy bottom just outside the reef, while a few kinds are found only in deep water. The food of the trepang consists of small larvae and animals, chiefly Foraminifera, or of sea plants, which it abstracts from the prodigious quantity of sand that passes through its alimentary canal. Some species secure in this manner great quantities of

¹ Small trepang are seldom gutted in the Philippines.

* A packing box, a barrel, or a smoke house made with mat sides will answer the purpose. The trepang must be placed at a distance from the fire, which should never burn brightly but simply smoulder.

larval Crustacea. The tufted arms, or tentacles, are constantly gathering food, which is thrust into the mouth of the animal.

The animal becomes of adult size in two years. It spawns in its third year. Some specimens, which I believed to be but two years old, contained many eggs. The young animals are white and transparent. They attach themselves to roots of sea plants or seek the safety of rocky crevices. I have found quantities of the young under rocks near shore.

The Japanese make use of this habit of the young in their sea farming by placing convenient rock piles in shallow water in order to attract the young. Japan has also set aside certain localities as breeding reserves for trepang, and in this way they conserve this valued sea product.

Considering that certain of these trepang are valued at more than 1.50 pesos each, that they can be grown on a comparatively restricted area of the reef, and that they are ready for the market in two years, it is rather surprising that no work on the cultivation of some of the best varieties has been undertaken. The trepang exported from the Department of Mindanao and Sulu during 1913 weighed 90,786 kilograms, valued at 35,107 pesos. During the first four months of 1914 there were exported 48,502 kilograms, valued at 15,626 pesos. This amount could be at least doubled by a little systematic work.

Australia exports trepang valued at 300,000 pesos each year. Japan consumes a large part of her own supply and exports 90,000 pesos' worth of trepang. The Philippine Islands, which occupy the most favorable position and have hundreds of miles of reef with an abundance of trepang, fall far below either Australia or Japan in their production of prepared trepang. There is an opportunity for canning and packing companies to enter this field and to supply trepang soup to the unlimited market of China.

ILLUSTRATIONS

PLATE I

Map, showing the location of sponge beds of Mindanao and Sulu. (Drawn in the Bureau of Science from Coast and Geodetic Survey charts 4200 and 4722.)

PLATE II. PHILIPPINE SPONGES

- FIG. 1. Elephant's-ear sponge.
2. Sulu Sea bath sponge.
3. Honeycomb sponge.
4. Sheep's-wool sponge.
5. Philippine zimocca sponge.
6. Grass sponge.

PLATE III. THREE SPECIES OF PHILIPPINE TURTLES

- FIG. 1. Head of the loggerhead turtle (*Thalassochelys caretta* Linn.).
2. Carapace of the loggerhead turtle.
3. Head of the hawksbill turtle (*Chelone imbricata* Linn.).
4. Carapace of the hawksbill turtle.
5. Head of the green turtle (*Chelone mydas* Linn.).
6. Carapace of the green turtle.

PLATE IV. PHILIPPINE COMMERCIAL TREPANG

- FIG. 1. Oh nyeow sam; great black trepang.
2. Buoy hwuh sam; long-prickled trepang.
- 3 Thang nyeow sam; sandy-bellied black trepang.
4. Gan sam; great teat trepang, or oval brown trepang.
5. Oe sam; great smooth black trepang.
6. Ang thoot sam; smooth red trepang.
7. Che sam, or moi whar che; great prickled trepang.
8. Bah sam, or che bah sam; convoluted trepang.
9. Thang sam; long black trepang.
10. Choo bah sam; brown trepang.
11. An tiow sam; spiculated trepang.
12. Choo bah sam; brown trepang.
13. Thoot sam; white spiculated trepang.
14. Thoot ah sam; common trepang.
15. Twa bing thoot sam; brown and white trepang.
16. Bing thoot sam; red and white trepang.
17. Liow thoot ah sam; yellow and brown trepang.
18. Peh thoot sam; white trepang

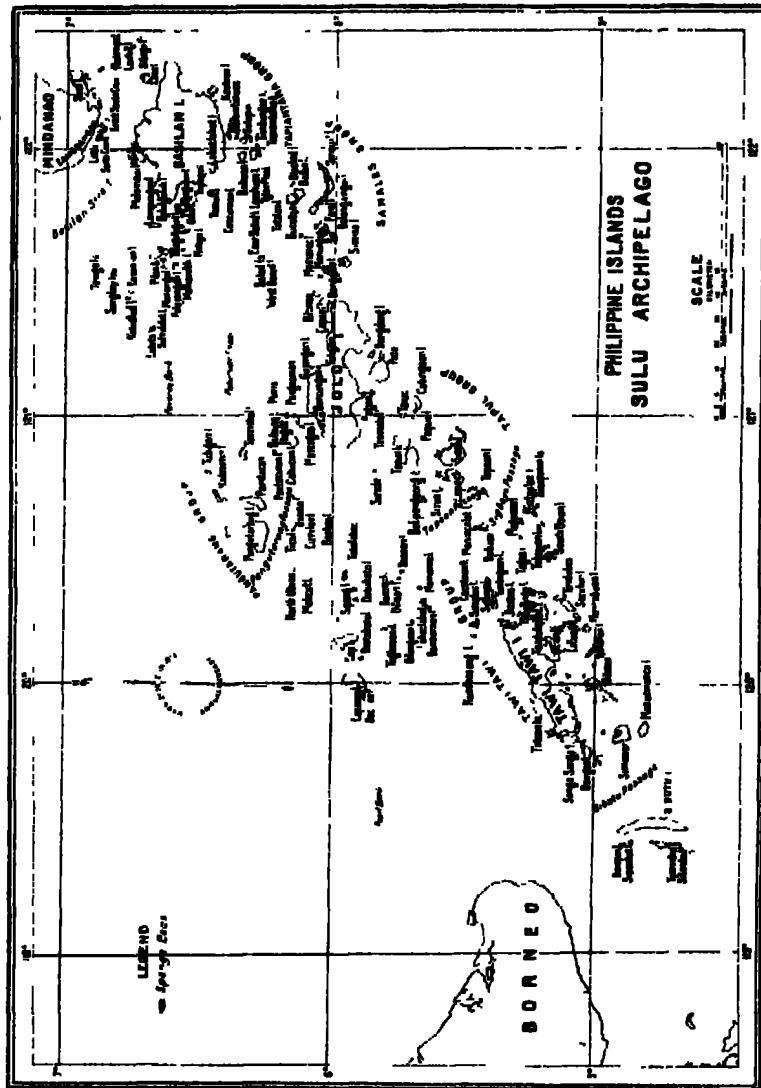


PLATE I. THE SPONGE BEDS OF MINDANAO AND SULU

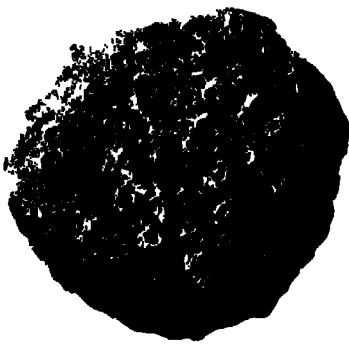
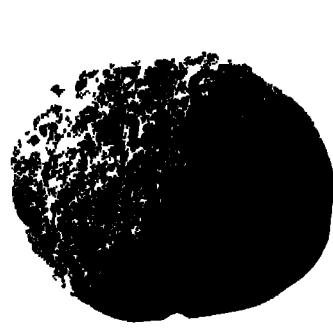
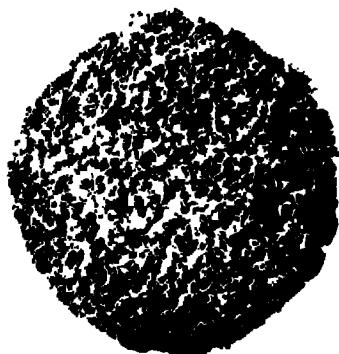


Fig 1. Elephant's-ear sponge. 2. Sulu Sea bath sponge. 3. Honeycomb sponge 4 Sheep's-wool sponge. 5 Philippine zimocca sponge. 6 Grass sponge



Fig. 1

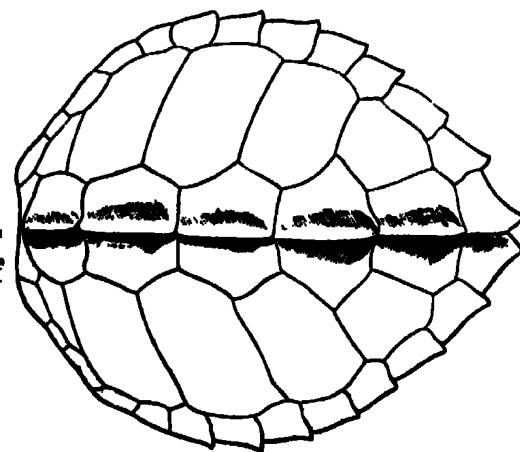


Fig. 2



Fig. 3

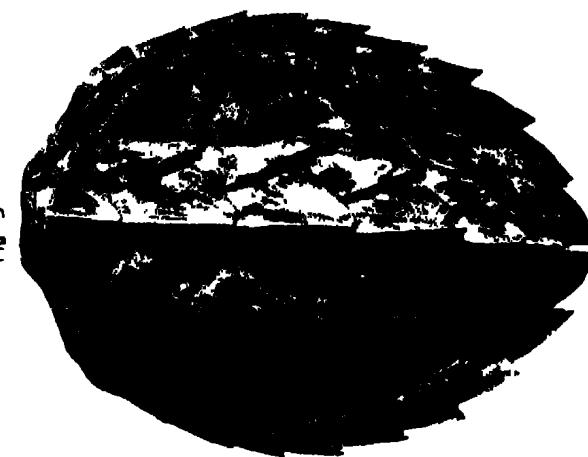


Fig. 4



Fig. 5



Fig. 6.

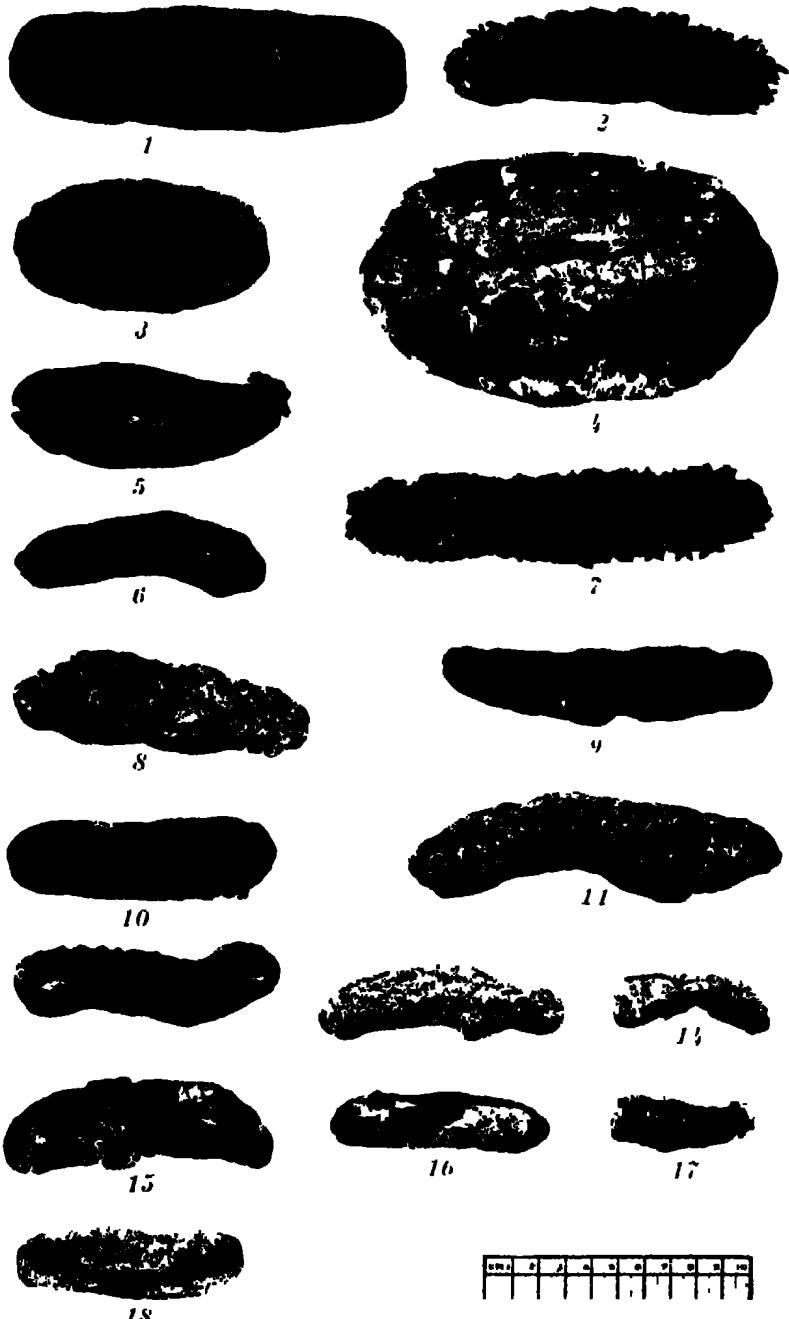


PLATE IV. PHILIPPINE COMMERCIAL TREPANG.

A PHILIPPINE APHRASTOBRACON

By C. F. BAKER

(From the College of Agriculture, University of the Philippines)

In 1896¹ W. H. Ashmead described a very remarkable hymenopterous parasite of the family Braconidae, from Ceylon, under the name *Aphrustobracon flavipennis*. It had been bred by Mr. E. E. Green from a culture of a lac insect, *Tachardia albizziae*, but probably came from a lepidopterous insect feeding on the *Tachardia*. In the structure of the head and the submedian cell in the wings it differed from all known members of this family, and as a consequence, Ashmead founded for it not only a new genus, but a new tribe in the subfamily Braconinae. Briefly it is a cyclostomatous braconid with immarginated occiput, having a linear face, greatly enlarged eyes but small ocelli, and the submedian cell much shorter than the median on the median vein.

Among the Rhogadinae of the Philippine Islands there are several genera related to *Gyroneuron* of Kokujew, described² from Assam, all of which present remarkable venational characters, accompanied by other unique structural details. Had Ashmead known *Gyroneuron*, he would not have passed without remark certain very similar venational features in *Aphrustobracon*. On account of this unique venation, I had accidentally placed a fine Philippine representative of *Aphrustobracon* with the Rhogadinae, from which, however, it is excluded by the immarginated occiput. Even from Ashmead's very incomplete description it is apparent that the Philippine species is entirely distinct from *Aphrustobracon flavipennis*.

Aphrustobracon philippinensis sp. nov.

Thorax and legs pale ochraceous, abdomen sordid ochraceous; antennae brownish black, paler apically. Wings faintly smoky, base of first cubital cell dark smoky, the costa above it black-spotted; veins pale ochraceous, paler on distal half of wing. Body clothed with whitish pubescence, heavier on legs, abdominal dorsum, and costa.

Male.—Head cubical, viewed from above with eyes little bulging

¹ Proc. U. S. Nat. Mus. (1895), 18, 646.

² Rev. Russ. Ent. (1901), 1, 232.

beyond the head outline, but deeply entering the head, the distance between them at the ocelli about equaling the length of cheek margin behind eyes; vertex behind ocelli broadly convex, smooth and shining, the distance from ocelli to occipital margin being about twice the shortest distance between eyes; ocelli small, distance between the two posterior a little less than distance from them to eyes; anterior ocellus remote from the two others, separated from them by twice the distance between eyes and posterior ocelli; surface between ocelli and eyes with very shallow wrinkles.

Face very narrow at middle, the outline that of a dumb-bell, broadened above by the deeply emarginated eyes, the width at antennæ and at clypeal margin being nearly twice that at the middle; surface with a short, poorly defined median carina below antennæ, and throughout finely, obscurely, irregularly rugose; clypeus narrowly semilunate, the clypeal pits separated from the eyes by their own diameter; mouth opening subcircular.

Head as viewed from side with margin of face parallel to eye margin; malar space nearly obsolete; cheek about one fourth as wide as the greatest eye diameter, its outer margin parallel to eye margin; eye very large, short subelliptical, broadest on lower half; third and fourth joints of maxillary palpi long, subequal.

Mesonotum deeply trilobed, smooth and shining, the notauli deeply impressed anteriorly, noncrenulate, and running straight backward to lateral angles of scutellum; posteromedian area broadly, evenly, shallow depressed. Scutellum triangular, large, evenly convex, smooth and shining; anteriorly with a deeply impressed, straight-margined, transverse, crenulate groove. Metanotum smooth and shining; spiracle large, subcircular, raised on a slight prominence, the surface before it slightly depressed, beneath it a fine, slightly impressed, longitudinal furrow. Pleura smooth and shining, the mesopleura without discal impressions; a deep furrow separating pro- and mesopleura above.

Abdomen sessile, longer than head and thorax together, spindle-shaped, broadest at fourth segment, seven segments being fully exposed; first segment a half longer than wide at apex, the second, the third, and the fourth subequal in length and a little shorter than the first; the second as long as wide at apex, the remainder wider than long; midlateral areas of first and second segments with broad, shallow, longitudinal impressions, these being parallel with outer margins of segments, and leaving subtriangular, median, raised areas; there are rudiments of such

impressions at lateral bases of third and fourth segments; the impressions on first and second segments are centrally, minutely carinate, and those on second, third, and fourth are minutely, irregularly rugose within; remainder of surface of all tergites smooth and shining; first suture normal; second suture medially, deeply impressed and crenulate obsolete at sides; a crenulate transverse groove occurs some distance behind the normal third suture; fourth suture impressed and crenulate. Hind tibiae with two stout, straight, pubescent spines, the inner a little the longer.

Wing surface very uneven by reason of several sharp folds in its membrane, one passing through median cell into second discoidal and another thence along cubitus. Stigma very large, broad, broadly rounded below, four times as long as wide, the radius inserted nearly at center. First abscissa of radius a little less than half the length of second; second cubital cell nearly three times as long as wide, a little narrowed apically, the first transverse cubital vein straight and very oblique, the second vertical and decolored; recurrent vein inserted near apex of first cubital cell, the intervening vein decolored; first abscissa of cubitus very strongly upcurved, making the first cubital cell very narrow. The transverse median vein is very oblique and is carried proximad to a distance before the basal vein equal to the apical width of median cell, the intervening portion of median vein and the postmedian vein greatly enlarged, the latter strongly curved; the second discoidal cell is thus of unusual size, twice as long as wide, long oval in outline, and broadly rounded apically; the parallel vein is interstitial, the juncture of the veins being greatly enlarged; the posterior vein, also, is unusually heavy.

Length, 7 millimeters.

Luzon, Laguna, Mount Maquiling (Baker).

This new species differs from *Aphrastobracon flavipennis* Ashmead in the greater size, scape two times as long as wide (three times in *flavipennis*); flagellar joints longer than wide ("wider than long" in *flavipennis*); face more coarsely sculptured ("finely shagreened" in *flavipennis*); and wings black-spotted at middle of fore margin (not so in *flavipennis*). Doubtless more fundamentally important differences will be recognized when *A. flavipennis* shall have been properly described.

A NEW GENUS OF DERBIDÆ FROM BORNEO

By FREDERICK MUIR

(Hawaiian Sugar Planters' Association, Honolulu, Hawaii)

ONE TEXT FIGURE

Genus **MONOCHORHYNCHUS** novum

Head narrower than thorax; vertex quadrate, width of base greater than length, apex about half of base, base obtuse-angularly emarginate, carinæ along base and sides fading out toward apex, basal area depressed, rising to apex, elevation at base of face making apex look angular; face narrow, lateral carinæ nearly touching in middle, basal half with lateral carinæ small and a fine median suture except at base where face is subtumid, apical half of face with deep lateral carinæ; clypeus much longer than face, strongly tricarinate; rostrum as long as clypeus, reaching to beyond the middle of abdomen, last segment short, greatly enlarged at apex so that it forms a suckerlike pad; eyes reniform, not reaching beyond the middle of the face; antennæ about half the length of face, terete, second joint slightly diminishing at base, flagellum at apex. Pronotum deeply and angularly emarginate on hind margin; mesonotum longer than broad, lateral angles behind middle, tricarinate, the lateral carinæ being sutures with fine carinæ on the outer edge. Tegmina with six median sectors, the third furcate; cubitus with two veins with the first median sector approximate; clavus small, open.

The tegmen in this genus is similar to that in *Paraprontista*, to which genus it is related, but the vertex, the face, and the apical joint of rostrum easily distinguish the two genera.

Type, *Monochorhynchus wahri* Muir.

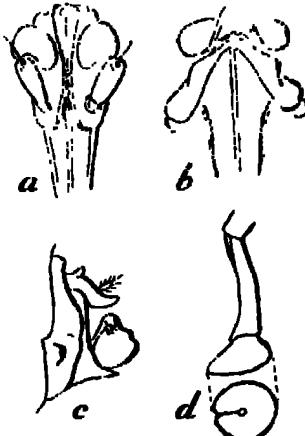


FIG. 1. *Monochorhynchus wahri* g. et sp. nov., a, face, front view; b, vertex and pronotum, dorsal view; c, genitalia, lateral view; d, rostrum, internal view.

Monochorhynchus wahri sp. nov.

Male.—Light brown, darker between carinæ of mesonotum, across lateral portions of pronotum, end of rostrum, and over abdominal tergites. Tegmina hyaline, slightly tinged with brown, clearer spots on basal half along costal and radial cells; wings half the length of tegmina, hyaline with brown veins.

Pygophor very short, ventral edge slightly and angularly produced to middle; anal segment longer than wide, anus near base, lateral margins gradually converging beyond anus to the rounded apex; genital style subquadrate, apex wider than base, dorsal edge with a small rim, dorsoapical corner forming a small, round knob with a small spine on it, apical edge with two small, strong spines on the inner margin.

Length, 4.3 millimeters; tegmen, 10.5.

Female unknown.

BORNEO (*J. E. A. Wahr*). Type, No. 13123, Bureau of Science collection.

ILLUSTRATION

TEXT FIGURE

FIG. 1. *Monochorhynchus wahri* g. et sp. nov., *a*, face, front view; *b*, vertex and pronotum, dorsal view; *c*, genitalia, lateral view; *d*, rostrum, lateral view.

NOTES ON A COLLECTION OF TERMITES FROM LUZON,
OBTAINED BY R. C. MCGREGOR

By MASAMITSU OSHIMA
(*Of the Government Institute of Science, Formosa*)

ONE TEXT FIGURE

In 1916 Mr. R. C. McGregor, of the Bureau of Science, Manila, made a small collection of termites in and near Manila, Luzon, which he very kindly forwarded to me for examination. In the present paper is given a record of this collection, with descriptions of three new species: namely, *Calotermes malatensis*, *Eutermes luzonensis*, and *Eutermes balintauacensis*.

Calotermes (Neotermes) malatensis sp. nov.

Imago.—Head reddish brown, pronotum, labial palpi, and antennæ somewhat paler; mesonotum, metanotum, and abdominal tergites yellowish brown; legs pale yellowish brown. Head sparingly pilose; long spiny hairs mingled with shorter ones on the pronotum; abdominal tergites beset with delicate hairs and provided with a series of long spiny hairs.

Head round; antennæ 19-jointed, second joint nearly as long as third, fourth joint shorter than third; eye large, prominent; ocellus in contact with eye; postclypeus indistinctly separated from forehead; anteclypeus trapezoidal, its anterior border nearly straight; labrum tongue-shaped, slightly longer than broad; pronotum quadrilateral, vaulted above, anterior border nearly straight, posterior border arcuate and slightly curved at middle, anterolateral corners depressed; mesonotum and metanotum narrower than pronotum, their posterior borders nearly straight; anterior wing stumps very much larger than the posterior, reaching beyond the middle of the latter; wings hyaline, veins yellowish brown; subcostal nerve of the anterior wing short, radius reaching to the basal third of costal margin, radius sector with six branches, median nerve runs near and parallel to the former, bending slightly at the base, cubitus reaches to tip of wing, with about ten branches, of which the proximal six are stronger; subcostal nerve absent in the posterior wing, radius reaching to the costal margin beyond the middle, radius sector with four

branches; median nerve starts from the middle of radius, cubitus with about nine branches.

	mm.
Length of body with wings	15.50
Length of body without wings	7.50-9.00
Length of anterior wing	11.00
Length of head	1.56
Width of head	1.50
Width of pronotum	1.78-1.87
Length of pronotum	1.09-1.18

Soldier.—Head reddish brown; anteclypeus yellow; antennæ reddish brown, paler anteriorly; mandibles blackish brown; pronotum pale yellow; mesonotum, metanotum, and abdomen straw-colored, the latter mottled with milky spots. Head sparingly pilose; sternites moderately pilose: on the abdominal tergites long spiny hairs mingled with shorter hairs.

Head cylindrical, sides slightly converging anteriorly, posterior border rounded; antennæ 15-jointed, second joint incurved, cone-

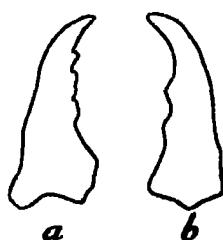


FIG. 1. *Calotermes malate-*
lensis sp. nov., soldier's
mandibles. a, left; b,
right.

shaped, and nearly as long as third, fourth and fifth joints subequal, much shorter than third; upper border of antennal fossa projecting laterally, overhanging the proximal joint of antennæ; rudimentary eye oval, situated behind the antennal fossa; no fontanelle; postclypeus not separated from forehead, a series of spiny hairs along its anterior border; anteclypeus quadrilateral, anterolateral corners rounded; labrum tongue-shaped, slightly broader than long, with a cluster of long hairs at the tip; mandibles stout, with incisive incurved tip, right mandible with two subequal, triangular teeth, left mandible with three teeth, the apical one pointed, the second and the third broad; pronotum quadrilateral and vaulted above, anterior border nearly straight, lateral borders convex, posterior border slightly curved at middle; mesonotum and metanotum much narrower than pronotum, with rounded posterior borders.

	mm.
Length of body	18.00
Length of head with mandible	5.83
Length of head without mandible	3.53
Width of head	2.33
Width of pronotum	2.61
Length of pronotum	1.56

Locality.—Luzon, Manila, Malate, October 15, 1916, from a decayed limb of a small tree, *Samanea saman* Merrill.

Coptotermes travians (Haviland).

Soldier.—Head yellow; mandibles brown; abdomen whitish. Head sparingly pilose; abdominal tergites densely provided with subequal hairs.

Head oval, slightly vaulted dorsally, sides converging anteriorly; fontanelle tube-shaped, large, its orifice directed forward, reaching beyond postclypeus; postclypeus very short; labrum triangular, tip hyaline, reaching to middle of mandibles; antennæ 14-jointed, third joint as long as second; submentum very weakly contracted at middle; pronotum slightly longer than half the width, anterior border distinctly indented at middle, posterior border weakly curved at middle.

	mm.
Length of body	4.50–5.00
Length of head with mandibles	1.97–2.08
Length of head without mandibles	1.84–1.40
Width of head	1.09
Width of pronotum	0.71–0.81
Length of pronotum	0.40–0.48

Locality.—Luzon, Manila, Malate, July, 1916, from tunnels in a telephone pole. Imago and worker were not collected.

Remarks.—The present species is here recorded for the first time from the Philippine Islands.

Termes (Macrotermes) philippinensis Oshima.**Soldier (the larger form).**—

	mm.
Length of body	9.00–9.50
Length of head with mandibles	4.68–5.00
Length of head without mandibles	3.33–3.53
Width of head	2.53–2.80
Width of pronotum	2.20–2.33
Length of pronotum	1.20–1.33

Soldier (the smaller form).—

	mm.
Length of body	5.00
Length of head with mandibles	3.49
Length of head without mandibles	2.08
Width of head	1.53
Width of pronotum	1.81
Length of pronotum	0.62

Locality.—Luzon, Manila, Malate, May, 1910.

Eutermes (Hospitalitermes) lusonensis sp. nov.

Eutermes (Hospitalitermes) hospitalis OSHIMA, Phil. Journ. Sci., Sec. D (1916), 11, 380, Pl. II, figs. 12–14.

Soldier.—

	mm.
Length of body	3.00-3.50
Length of head with rostrum	1.71-1.74
Length of head without rostrum	1.25-1.28
Width of head	1.00-1.08
Width of pronotum	0.58-0.59

Locality.—Luzon, Balintauac, near Manila, August 6, 1916.

Remarks.—In my previous paper I identified the present species with *Eutermes hospitalis* Haviland. However, after close examination of a vast number of specimens I have recently come to the conclusion that it is reasonable to separate the two. There are two forms of worker in *Eutermes luzonensis*, instead of one as in the other, and the soldier's head is much smaller.

Eutermes (Eutermes) balintauacensis sp. nov.**Imago.—Unknown.**

Soldier.—Head yellow, tip of rostrum becoming yellowish brown; antennæ yellow; thorax and abdomen yellowish white; legs straw-colored. Head very sparingly pilose; sternites smooth; abdominal tergites densely beset with microscopically minute hairs.

Head ovoid, with slender conical rostrum, upper surface slightly incurved at junction of rostrum; antennæ 12-jointed, third joint the smallest, second joint longer than third, fourth joint slightly longer than second; pronotum saddle-shaped, anterior border rounded.

	mm.
Length of body	3.00-3.20
Length of head with rostrum	1.34-1.43
Length of head without rostrum	0.74-0.81
Width of head	0.81-0.84
Width of pronotum	0.37-0.40

Worker.—Head yellow, Y-sutures distinct, whitish; thorax and abdomen white. Head sparingly pilose; abdominal tergites densely provided with delicate hairs.

Head round; postclypeus swollen, less than half as long as broad; antennæ 13-jointed, second joint slightly shorter than fourth, third joint the smallest and shorter than second; pronotum saddle-shaped, anterior border indented at middle.

	mm
Length of body	3.50
Width of head	0.93
Width of pronotum	0.50

Locality.—Luzon, Balintauac, near Manila, August 6, 1916, from a covered tunnel on a small tree, *Caesalpinia sappan* Linn.

Remarks.—The present species is closely allied to *Eutermes minutus* Oshima. However, it differs from the latter in having a shorter and narrower head in the soldier.

Eutermes minutus Oshima.

Locality.—Luzon, Rizal Province, Las Piñas, near Manila, August 27, 1916; from the inside of an old log.

Microcerotermes los-banosensis Oshima.

Locality.—Luzon, Manila, Malate, July 30, 1916, from a fence post.

ILLUSTRATION

TEXT FIGURE

FIG. 1. *Calotermes (Neotermes) malatensis* sp. nov., soldier's mandibles, *a*, left; *b*, right.

NOTES ON JAPANESE LEPIDOPTERA AND THEIR LARVÆ:
PART IV¹

By A. E. WILEMAN
(London, England)

TWO COLORED PLATES

HETEROERA
AGARISTIDÆ

Genus **CHELONOMORPHA** Motschulsky

Chephonomorpha MOTSCHULSKY, Etud. d'Ent. (1860), 9, 30.

Chephonomorpha japonica Motschulsky.

Plate I, fig. 1, larva; fig. 2, food plant.

Japanese name, *toraga*.²

Chephonomorpha japonica MOTSCHULSKY, Etud. d'Ent. (1860), 80; LEITCH, Trans. Ent. Soc. London (1899), 212, No. 681; HAMPSHIRE, Cat. Lep. Phal. (1901), 3, 529; MATSUMURA, Cat. Insect. Jap. (1905), 1, 112, No. 969; KIRBY, Cat. Het. (1892), 30; JORDAN, Seitz's Macrolep. Faun. Pal. (1906), 3, 6, Pl. I b; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1910), suppl. 2, 69, Pl. 23, fig. 1, ♂.

Eusemia villicoides BUTLER, Ann. & Mag. Nat. Hist. (1875), IV, 15, 141, Pl. 13, fig. 2 (= *japonica* Motsch.).

Eusemia japonica LEITCH, Proc. Zool. Soc. London (1888), 613, No. 168. *Chephonomorpha austeni* MOORE, Lep. Atk. (1879), 11; HAMPSHIRE, Moths India (1894), 2, 154; Cat. Lep. Phal. (1901), 3, 529, fig. 231, ♀; JORDAN, Seitz's Macrolep. Faun. Pal. (1906), 3, 6, Pl. I b.

The larva figured (Plate I, fig. 1) was taken in September (figured September 15), 1902, at Hakodate, Oshima Province, Hokkaido, on *shiode* (*Smilax herbacea* Linn. var. *nipponica* Maxim.), and I bred a female imago from it July 7, 1903.

¹ The first paper of this series was printed in *This Journal*, Sec. D (1914), 9, 247-268, 3 pls.; Part II, in (1915), 10, 281-306, 3 pls.; Part III, in (1915), 10, 345-364, 3 pls.

² In his Catalogus Insectorum Japonicum [sic] (1905), 112, Matsumura gives the Japanese name of *toraga* to *Mimeusemia persimilis* Butl., and in his Nihon Senchū Dzukai (1910), 69, he gives the same name to *Chephonomorpha japonica* Motsch.

The following description is taken from my original figure:

Larva.—Bluish white, marked with many irregular black spots and dashes; head black; legs, prolegs, and claspers black; segment 2 (head counting as segment 1) orange with transverse series of small black spots; segment 12 dorsally orange with four black spots; anal shield black; a faint suprapedal orange stripe from segment 3 to 12, more conspicuous over prolegs on segments 7, 8, 9, and 10.

Local distribution.—Hokkaido (Yezo): Hakodate, Oshima Province, May, July (Leech, Wileman). Honshu: Nikko, Shimotsuke Province, July (Wileman).

Chelonomorpha japonica seems to be a mountain species, as I have never met with it in the plains except in Hokkaido. Matsumura records it from Hokkaido and Honshu.

Time of appearance.—Larva, September; imago, June and July.

General distribution.—Central and northern Japan in June and July; western and central China; northern India (Hampson, Jordan).

ARCTIIDÆ

NOLINÆ

Genus ROESELIA Hübner

Roeselia HÜBNER, Verz. (1827), 397.

Roeselia mandschuriana Oberthür.

Plate I, fig. 3, larva; fig. 4, food plant; fig. 5, head and dorsal process. Japanese name, Hakodate, *kobuga*.¹

Erustria mandschuriana OBERTHÜR, Etud. d'Ent. (1880), 5, 83, Pl. 2, fig. 9; KIRBY, Cat. Het. (1892), 371; BUTLER, Ann. & Mag. Nat. Hist. (1881), V, 7, 236; LEECH, Proc. Zool. Soc. London (1888), 609, No. 140; STGR., Rom. Mém. Lép. (1892), 6, 257; LEECH, Trans. Ent. Soc. London (1899), 210, No. 676; HAMPSHON, Cat. Lep. Phal. (1900), 2, 74, fig. 19, ♂; STGR. and RAB., Cat. Lep. Pal. (1901), 1, 359, No. 4097; MATSUMURA, Cat. Insect. Jap. (1905), 1, 166, No. 1410; SEITZ, Macrolep. Faun. Pal. (1910), 2, 46, Pl. 10 e.

Nola albula Fixsen (nec Hübner) var. *a*, *mandschurica* [sic = *mandschuriana*] OBERTHÜR, Rom. Mém. Lép. (1887), 3, 327.

The larva figured (Plate I, fig. 3) was taken in July (figured July 5), 1902, at Hakodate, Oshima Province, Hokkaido (Yezo), on cherry, Japanese name, *sakura* (? *Prunus pseudocerasus* Lindl.).

This larva died, but several imagoes were obtained from other larvae taken at the same time and place; one of these emerged

¹ This moth is unnamed in Japanese by Matsumura, and I have, therefore, named it.

July 30, 1902. The following description is taken from my original notes:

Larva.—Ashy gray. Long, slender hairs issue from segment 2 pointing forward, also from the spiracular line and anal segment. On segments 2 to 6 (counting head as segment 1) there are long dorsal tufts of ashy gray hairs; the tuft on segment 2 is the shortest, the tufts on segments 3 to 6 gradually increase in length, the longest tuft being on segment 6. The larva bears a most extraordinary vertical dorsal process situated between the head and the succeeding segment (Plate I, fig. 5). This process consists of five chitinous plates, apparently the sloughed plates of the head, which seem to indicate five molts, as the uppermost plate, counting from the top of the process, is the smallest; this would seem to prove that the sloughed plates are pushed upward vertically as each successive molt takes place.

Pupa.—The cocoon, or pupa case, is somewhat triangular with acute prolonged ends. It is attached to a twig and harmonizes exactly with the bark. Two long tufts of hair issue from the apex of the triangle.

Local distribution.—Honshu: Oiwake, Shinano Province (Pryer); Tokyo Musashi Province (Fenton); Yoshino, Yamato Province, May and June (Wileman); Karuizawa, Shinano Province, July (Wileman). Hokkaido (Yezo): Jozankei, Ishikari Province, and Hakodate, Oshima Province, July and August (Wileman).

Time of appearance.—Larva, July; imago, May to August.

General distribution.—Eastern Siberia (Sutschan and Ussuri, near Chabarovsk and Vladivostock, Askold Island); Korea; Japan.

ARCTIIDÆ

LITHOSIINÆ

Genus *ILEMA* Hübner

Ilema (*Eilema*) HÜBNER, Verz. (1827), 165.

Ilema griseola Hübner.

Plate I, fig. 6, larva (*Ilema nigrota* Butler); fig. 7, pupa and food plant.
Japanese name, *kishita-hosoba*.

Bombyx griseola HÜBNER, Eur. Schmett. (1827), 2, fig. 97; LEECH, Proc. Zool. Soc. London (1888), 599, No. 87; ALPH. ROM. Mém. Lép. (1892), 6, 10; HAMPSH., Moths India (1894), 2, 80; LEECH, Trans. Ent. Soc. London (1899), 181, No. 575; HAMPSH., Cat. Lep. Phal. (1900), 2, 168; STAR. and RHE., Cat. Lep. Pal. (1901), 1, 377,

No. 4294; MATSUMURA, Cat. Insect. Jap. (1905), 1, 179, No. 1498; MIYAKE, Tokyo Zool. Mag. [Tōkyō Dōbutsugaku Zasshi (Jap.)] (1910), 22, pt. 260, 384, 375, Pl. 11, fig. 12, ♂; SEITZ, Macrolep. Faun. Pal. (1910), 2, 65, Pl. 12 g, ♂; 12 h, ♀ and under-side.

Lithosia flava HAW., Lep. Brit. (1809), 147; WOOD, Ind. Ent., 29, Pl. 8, fig. 99; STGR. and REB., Cat. Lep. Pal. (1901), 1, 377, No. 4294 a; (=stramineola Doubl.).

Lithosia stramineola DOUBL., Zool., 5, 1914.

Lithosia plumbeolata STEPH., Ill. Brit. Ent. Haust. (1829), 2, 96.

Lithosia serva WALKER, Cat. Lep. Het. (1854), 2, 506; MOORE, Proc. Zool. Soc. London (1878), 15, Pl. 1, fig. 7; KIRBY, Cat. Het. (1892), 327.

Lithosia vetusta WALKER, Cat. Lep. Het. (1854), 2, 506; KIRBY, Cat. Het. (1892), 324; (=amurensis Stgr.).

Lithosia agrota BUTLER, Ann. & Mag. Nat. Hist. (1877), IV, 20, 397; Ill. Typ. Lep. Het. (1879), 3, 8, Pl. 42, fig. 18; KIRBY, Cat. Het. (1892), 323; SEITZ, Macrolep. Faun. Pal. (1910), 2, 65, Pl. 12 h (=adaucta Butl., cinerea Pouj., lenta Leech); STGR. and REB., Cat. Lep. Pal. (1901), 1, 377, No. 4294 b.

Lithosia adaucta BUTLER, Ann. & Mag. Nat. Hist. (1877), IV, 20, 398; Ill. Typ. Lep. Het. (1878), 2, 6, Pl. 28, fig. 6; KIRBY, Cat. Het. (1892), 323.

Collita lilacina MOORE, Proc. Zool. Soc. London (1878), 16; KIRBY, Cat. Het. (1892), 324.

Lithosia cinerea POUJ., Bull. Soc. Ent. France (1886) (6), vi, cl; KIRBY, Cat. Het. (1892), 322.

Lithosia lenta LEECH, Entom. (1890), 23, 81.

Lithosia amurensis STGR., Rom. Mém. Lép. (1892), 6, 268; STGR. and REB., Cat. Lep. Pal. (1901), 1, 377, No. 4294 b.

Lepista subumbra HOLLAND, Psyche (1893), 6, 411.

Lithosia fuscicilia HAMPSHON, Moths India (1894), 2, 80.

The larva figured (Plate I, fig. 6) was taken in May (figured May 16), 1901, at Kobe, Settsu Province, Honshu, on a lichen; and a female imago of the form *agrota* Butler emerged June 1, 1901.

Hampson⁴ gives the following descriptions of the larva of *Ilema griseola* Hübner:

Larva, Meyrick, Brit. Lep. p. 28; Barrett, Lep. Brit. ii, p. 226, Pl. 67, fig. 1. Blackish brown, hairs dark brown; dorsal line black; subdorsal line orange-yellow interrupted, enlarged and partly confluent on somites 1, 2 and 12, otherwise rather faint; head shining black. Food-plants, Lichens and dead leaves; 8-6.

The original figure of my larva of *agrota* Butler agrees best with this description.

⁴ Cat. Lep. Phal. (1900), 2, 168.

Wilson⁴ describes the larva of *Ilema griseola* Hübner as follows:

Larva. About ten lines long, and nearly black, the segmental divisions deeply cut; each segment has a number of black velvety tubercles, and each of these bears a tuft of short hairs; along each side of the back is an interrupted orange-colored *subdorsal* line; these lines approximate and then widen on segment 2, 3, and on segment 12 take the form of two orange spots; the ventral area is rather paler than the dorsal; legs and claspers the same; head small, black and shining.

Seitz⁵ describes the larva of *Ilema griseola* Hübner as follows:

Larva black-grey, with reddish-yellow spots behind the head, from segment 3 backwards two reddish-yellow longitudinal stripes *dorsally* [not subdorsally as in Wilson] between which there is a black dorsal line. Until the beginning of June, on lichens on trees. Pupa glossy reddish brown, in a cocoon of moss or lichen. The moths in July and August, often common in Central Europe, and in Amurland (East Siberia) on tree-trunks and the branches of suckers.

Seitz does not say that the longitudinal reddish yellow dorsal stripes are interrupted as they are in my figure. Wilson says "an interrupted orange-colored subdorsal line."

Pupa.—Contained in a webbed cocoon spun on lichen (Plate I, fig. 7).

Miyake⁶ states of the Japanese forms *segrota* and *adaucta* that the larvae are to be found on *sasa*, bamboo grass, and that they possibly feed upon that. I think, however, that they probably collect there to sun themselves, crawling up from lichens near at hand, as lichen is the food plant of *griseola* in Europe, and my larva was found on lichen.

Imago.—Leech⁷ remarks:

The species [*griseola*] is a very variable one. The descriptions of *adaucta* and *segrota* apply rather to individual specimens than to constant forms.

Ilema adaucta and *I. segrota* are the forms of *I. griseola* occurring in Japan.

In the Far East the species varies considerably. In Amurland it is much smaller and the ground color of the forewing is so light that the costal stripe only slightly contrasts with it; this is *vetusta* Wlk. (= *amurensis* Stgr.). *Segrota* Butl. (= *adaucta* Butl.; *cineracea* Pouj.; *lenta* Leech) on the other hand, is larger than European *griseola* and the forewing darker, the hindwing, which is yellow above, contrasting sharply with it; from Japan.⁸

⁴ Larvae of British Lepidoptera (1880), 59, Pl. 10, fig. 16.

⁵ Seitz, Macrolep. Faun. Pal. (1910), 2, 65.

⁶ Tokyo Zool. Mag. (1910), 22, pt. 280, 376.

⁷ Trans. Ent. Soc. London (1899), 181.

⁸ Seitz, Macrolep. Faun. Pal. (1910), 2, 65.

Local distribution.—I have taken *egrota* and *adaucta* in the following localities: Honshu: Nikko, Shimotsuke Province, June; Tokyo, Musashi Province, May; Oyama, Sagami Province, May; Tennokawa, Yoshino, and Obatani, Yamato Province, June and July; Takami Toge (Pass), Ise Province, October. Kyushu: Kimbo-san, Kossadake, Haramachi, Higo Province, May, June, and July; Kagoshima, Satsuma Province, July. Hokkaido (Yezo): Junsai Numa, Oshima Province, July; Jozankei, Ishikari Province, August; Teshiwo, Teshiwo Province, July.

This species is common in most places in Japan. I found it especially abundant at Jozankei, near Sapporo, Hokkaido, in August, 1896.

Matsumura records the species from Hokkaido, Honshu, and Kyushu; and Miyake records it from the same islands. He gives the time of appearance as July and August and says that it is common in Hokkaido and not common in Tokyo, Honshu, so that it is evidently more abundant in the extreme north of Japan.

Time of appearance.—Larva, May; imago, June, July, August, September, October.

General distribution.—Europe; Altai; eastern Siberia (Amur-land); Japan; northern China; Tibet; Nepal; Sikkim; Manipur; Yunnan; Borneo; western Africa (*Hampson*); Korea (*Matsumura*, *Miyake*).

This moth also occurs outside the Palaeartic Region: for example, as *lilacina* Moore and *fuscidilia* Hampson, in India; as *serva* Walker, in the Malay Archipelago (and Japan?); and as *subumbrata*, in West Africa. (Seitz.)

ARCTIIDÆ

ARCTIINÆ

Genus DIACRISIA Hübner

Diacrisia HÜBNER, Verz. (1827), 169.

Diacrisia subcarnea Walker.

Plate II, fig. 1, larva.

Japanese names, *obi-hitori*, *kara-aka-hitori*.

Spilosoma subcarnea WALKER, Cat. Lep. Het. (1855), 3, 675; KIRBY, Cat. Het. 232; BUTLER, Ill. Typ. Het. Lep. (1879), 3, 6, Pl. 42, fig. 8; LERCH, Proc. Zool. Soc. London (1888), 619, No. 188; Trans. Ent. Soc. London (1890), 149, No. 490; HAMPSHON, Cat. Lep. Phal. (1901), 3, 315; MATSUMURA, Cat. Insect. Jap. (1905), 1, 172, No. 1446; DYAR, Proc. U. S. Nat. Mus. (1905), 28, 944; MIYAKE, Bull. Coll. Agr., Tokyo Imp. Univ. (1909), 8, No. 2, 161; SEITZ, Macrolep. Faun. Pal. (1910), 2, 86, Pl. 15 d; MATSUMURA, Thousand

- Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1911), suppl. 3, 80, Pl. 36, fig. 9, ♂.
Aloc bifrons WALKER, Cat. Lep. Het. (1855), 3, 705; KIRBY, Cat. Het. (1892), 232.
Aloc leucothorax FLD., Wien. Ent. Mon. (1862), 6, 36; KIRBY, Cat. Het. (1892), 232.
Spilosoma erubescens MOORE, Ann. & Mag. Nat. Hist. (1877), IV, 20, 89; KIRBY, Cat. Het. (1892), 231.
Spilosoma rybakovi ALPH., Rom. Mém. Lép. (1897), 9, 171, Pl. 10, fig. 9, ♂.
Hyarias oberthüri SEMP., Schmett. Phil. (1899), 2, 489.
Diacrisia robustum HAMPTON, Cat. Lep. Phal. (1901), 3, 816 (aberr.).
Diacrisia subcarnea var. *flavoventris* MIYAKE, Bull. Coll. Agr., Tokyo Imp. Univ. (1909), 8, 162, ♀, with orange-yellow, instead of red, abdomen.

The larva figured (Pl. II, fig. 1) was taken in September (figured September 29), 1900, at Yoshino, Yamato Province, Honshu, on mulberry, Japanese name, *kuwa* (*Morus alba* Linn.); and a female imago emerged from the resulting pupa May 20, 1901. Two other females emerged May 14 and 16, respectively, from larvae taken in the same month at the same place.

Miyake¹⁰ describes the larva of *Spilosoma subcarnea* as follows:

Larva. Ochraceous yellow with long ochraceous hairs; head and legs fulvous black; a brownish subdorsal line; tubercles greyish white. Food-plant: mulberry-tree. [This agrees well with the original figure of my larva.]

Dyar¹¹ remarks:

The larva is a large hairy Arctian of the shape of the North American *Estigmene acrea* Drury, lightly colored as in pale specimens of *Diacrisia virginica* Fabricius. The head, thoracic feet and abdominal leg plates are black. Body immaculate, except for broken mottled dark subdorsal and substigmatal stripes. [This description was taken from a preserved specimen.]

Local distribution.—Honshu: Tokyo, Musashi Province, April, May, June, August (Wileman); Yoshino, Yamato Province, May, June, August, September (Wileman). Shikoku: Hosono, Iyo Province, August (Wileman). Kyushu: Hikosan, Buzen Province, August (Wileman). It has been found in Honshu, Shikoku, and Kyushu Islands; and Matsumura records it from Hokkaido (Yezo), Honshu, and Ryukyu (Loochoo).

Time of appearance.—Larva, September; imago, April to September. Double-brooded?

¹⁰ Bull. Coll. Agr., Tokyo Imp. Univ. (1909), 8, 162.

¹¹ Proc. U. S. Nat. Mus. (1905), 28, 944.

General distribution.—Throughout Japan, China, and Korea; eastward to the Philippines and southward to the Malay Archipelago. (Seitz.)

Diacrisia nivea Ménétrries.

Plate I, fig. 8, larva; fig. 9, food plant.

Japanese names, *shiro-hitori* and *kyo-joro*.

Dionychopus niveus MÉNÉTRIES, Bull. Phys. Math. Pétr. (1859), 17, 218; Schrenck's Reisen, Lep. (1859), 2, 52, Pl. 4, fig. 6; PRYER, Trans. Asiatic Soc. Japan (1885), 12, 48, No. 138; LEECH, Proc. Zool. Soc. London (1888), 620, No. 196; KIRBY, Cat. Lep. Het. (1892), 1, 229; STAUDINGER, Rom. Mém. Lép. (1892), 6, 289; LEECH, Trans. Ent. Soc. London (1899), 151, No. 494; STGR. and REN., Cat. Lep. Pal. (1901), 1, 365, No. 4165; BUTLER, Cist. Ent., 2, 32; HAMPSON, Cat. Lep. Phal. (1901), 267; MATSUMURA, Cat. Insect. Jap. (1905), 1, 173, No. 1453; MIYAKE, Bull. Coll. Agr., Tokyo Imp. Univ. (1909), 8, 157; SEITZ, Macrolep. Faun. Pal. (1910), 2, 88, Pl. 15 h; MATSUMURA, Thousand Insects of Japan [Nihon Sennkō Dzukai (Jap.)] (1911), suppl. 3, 27, Pl. 32, fig. 4, ♀.

The larva figured (Plate I, fig. 8) was taken in June, 1902, at Hakodate, Oshima Province, Hokkaido (Yezo) on an herb of which I know neither the Latin nor the Japanese name. This larva died, but I bred two female imagoes at Hakodate on August 17 and 19, 1902, from larvae compared with my original figure of the June larva.

Matsumura¹² describes the larva as follows and states that it feeds on *obako* (*Plantago major* Linn. var *asiatica* DCNE.) and *tampopo* (*Taraxacum officinale* Wigg. var *glaucescens* KOCH): "Dark ashy-grey with long ashy-grey yellow hairs; pale lateral markings."

Graeser says that the larvae, which hibernate in the young stage, are full grown by June and that the imago emerges in July.

Staudinger¹³ describes the larva as follows:

Dirty-grey with lighter lateral markings and fascicles of long yellowish-grey hairs, which are not so bushy as in *Arctia caja*, but are thicker than in *Arctia purpurata*.

I describe my larva from the original figure as follows:

Larva.—Head ochraceous black with white V mark; body ruddy brown with the segmental divisions well marked by darker color; dorsal and lateral fascicles of hair ruddy gray; spiracles white; legs and prolegs ochraceous.

¹² Thousand Insects of Japan (1911), suppl. 3, 27.

¹³ Rom. Mém. Lép. (1892), 6, 289.

Image.—“Wings sometimes with traces of small blackish spots * * *. The moths in July and August, local but common at their flight places; they fly out of the grass making a noise, according to Doenitz. I could also hear a slight clicking sound of the wings when *niveum* flew close by me, like that made by many larger arctiids, especially *Callimorpha*, but also by the small *Parasemia plantaginis*.¹⁴”

Leech says that the black discal spot of secondaries is sometimes absent.

Local distribution.—Honshu: Nikko, Shimotsuke Province, July and August (Wileman); Yoshino, Yamato Province, July and August (Wileman); Karuizawa, Shinano Province, July (Wileman). Hokkaido: Hakodate, Oshima Province, August (Wileman).

Matsumura records the species from Karafu-to (Saghalin), Hokkaido, Honshu, Kyushu, Shikoku, Korea, China, and Manchuria. He includes Shikoku as a locality in one of his works and excludes it in another.

Time of appearance.—Larva, June; imago, July and August.

General distribution.—Throughout eastern Asia, eastern Siberia (Amurland), China with the exception of the south, Korea, and Japan. (Seitz.)

Diacrisia imparilis Butler.

Plate I, fig. 10, larva; fig. 11, head; fig. 12, dorsal section.

Japanese name, *kuwa-gomadara-hitori*.

Spilarctia imparilis BUTLER, Ann. & Mag. Nat. Hist. (1877), IV, 20, 894, ♂; Ill. Typ. Het. (1878), 2, 4, Pl. 22, fig. 4, ♂; Ann. & Mag. Nat. Hist. (1879), V, 4, 351, ♀; FIXSEN, Rom. Mém. Lép. (1887), 3, 334, ♂ and ♀; LEECH, Proc. Zool. Soc. London (1888), 620, No. 193; Trans. Ent. Soc. London (1899), 153, No. 501; MATSUMURA, Japanese Injurious Insects [Nihon Gaichuhen (Jap.)] (1899), 29, Pl. 12, figs. 1 and 2, imago ♂ and ♀; fig. 3, ova; fig. 4, larva; fig. 5, pupa; KIRBY, Cat. Het. (1892), 282; HAMPSON, Cat. Lep. Phal. (1901), 3, 308; MATSUMURA, Cat. Insect. Jap. (1905), 172, No. 1451; DYAR, Proc. U. S. Nat. Mus. (1905), 28, 944, fig. 6, larva; MIYAKE, Bull. Coll. Agr., Tokyo Imp. Univ. (1909), 8, No. 2, 166; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1911), suppl. 3, 4, Pl. 30, fig. 5, ♀; SEITZ, Macrolep. Faun. Pal. (1910), 2, 87, Pl. 15 f, ♀; SASAKI, Kwaju Gaichūhen [Insects Injurious to Fruit Trees (Jap.)], ed. 5 (1911), 60 and 197, Pl. 14, larva and imago.

The larva figured (Plate I, fig. 10) was taken in July (figured July 7), 1902, at Hakodate, Oshima Province, Hokkaido (Yezo), on *niwatoko* (*Sambucus racemosa* Linn.), and a male imago emerged August 16, 1902. Another larva pupated August 8, 1902, and the imago emerged August 11, 1902.

¹⁴ Seitz, Macrolep. Faun. Pal. (1910), 2, 88.

The larva is one of the commonest of the arctiids in Tokyo and is to be met with in May and June on many kinds of low-growing herbs and shrubs. It is closely allied to the larva of *Diacrisia infernalis* Butl. The pupa is inclosed in a loose-webbed cocoon, spun in leaves of the food plant.

Matsumura¹⁵ records the life history of this species and gives figures of the imago, male and female; the ova; the larva; and the pupa. He says that in Hokkaido the species is single-brooded. The larva hibernates after the second molt, on or near the food plant, until the spring of the following year. The imago emerges at the end of July. The female imago covers the ova, which are approximately two hundred in number, with hairs from the anal tuft. It is possible that this species is double-brooded in southern Honshu.

The eggs are laid in a patch covered by the brownish wool from the abdomen of the female moth.

The larvae resemble those of *Arsilonche albovenosa* in color, being black with yellow spots and red warts. The hairs are black and white, rather thin and do not obscure the body coloration. Head rounded, bilobed, flat before, shining black, paraclypeus reddish, epistoma and bases of antennae white. Body cylindrical, normal, with large, elevated, bright-red warts. Wart i is small, ii, iii, and v large, iv absent, vi large, black, base of leg broadly hairy. On the thorax, two warts above the stigmatal wart, normal. Cervical shield densely hairy. Black; a dorsal yellow line, broken into two spots on each segment; fine yellow dotting to a narrow broken subdorsal line; sides more heavily dotted to a waved broken substigmatal line. Feet reddish with black shields.

The cocoon is composed of hair and thin silk. The pupa has the usual Arctian shape.¹⁶

The above description of the larva appears to have been taken from preserved specimens. Dyar does not mention the metallic blue described by Miyake.

Larva. Purplish fuscous, with hairs of greyish white and greyish black; head and legs greyish fuscous; a dorsal and subdorsal series of greyish yellow spots; tubercles mostly ochraceous brown, some of 6-12 somites metallic blue; prothoracic shield metallic blue.

Food-plants: mulberry-, peach-, pear-, plum-, cherry-, apple-tree and many others.¹⁷

Imago.—*Diacrisia imparilis* Butl. and *D. infernalis* Butl. are closely allied to each other in the larval and the imaginal stages. The male imagoes of both species are blackish brown, and the

¹⁵ Japanese Injurious Insects (Nichon Gaichūhen) (1899), 29.

¹⁶ Dyar, Proc. U. S. Nat. Mus. (1905), 28, 944, fig. 6, larva.

¹⁷ Miyake, Bull. Coll. Agr., Tokyo Imp. Univ. (1909), 8, 167.

females are creamy white and pale buff. Leach remarks of *imparilis* that—

the black maculation is a variable character in the female; one example of this sex from Hokkaido (Yesso) is devoid of markings with the exception of a black dot on the left primary.

I possess a specimen similar to that described by Leech.

Local distribution.—Honshu: Tokyo, Musashi Province, August (Wileman); Nikko, Shimotsuke Province, August (Wileman); Yoshino, Yamato Province, August and September (Wileman). Hokkaido: Hakodate, Oshima Province, August (Wileman). Throughout the Japanese Islands (Matsumura, Seitz); very common in Hondo (Honshu); the larvae are very common on various plants in Tokyo (Miyake).

Time of appearance.—Larva, May, June, and July, hibernates; imago, July, August, and September. Single-brooded.

General distribution.—Japanese Islands only.

Diacrisia infernalis Butler.

Plate II, fig. 2, larva; fig. 8, food plant; figs. 4 and 5, imago and head of variety 1, *immaculalis* nov., ♀; figs. 6 and 7, imago and head of variety 3, ♀, unnamed; figs. 8 and 9, imago and head of variety 4, *maculalis* nov., ♀.

Japanese name, *kurobane-hitori* and *kurohane-hitori*.

Thanatarctia infernalis BUTLER, Ann. & Mag. Nat. Hist. (1877), IV, 20, 395; Ill. Typ. Lep. Het. (1879), 3, 7, Pl. 42, fig. 9, ♂; LEECH, Proc. Zool. Soc. London (1888), 617, No. 182; KIRBY, Cat. Het. (1892), 277; LEECH, Trans. Ent. Soc. London (1899), 160, No. 519; HAMPSHOR, Cat. Lep. Phal. (1901), 3, 312, ♂ and ♀; MATSUMURA, Cat. Insect. Jap. (1905), 173, No. 1456; MIYAKE, Bull. Coll. Agr., Tokyo Imp. Univ. (1909), 8, 167; SEITZ, Macrolep. Faun. Pal. (1910), 1, 87, Pl. 16 f, ♂; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1911), suppl. 3, 6, Pl. 30, fig. 9, ♀.

The larva figured (Plate II, fig. 2) was taken in May (figured June 1), 1901, at Kobe, Settsu Province, Honshu, on willow, Japanese name, *yanagi* (*Salix*). A female imago emerged from the resulting pupa in July, 1901. This female is not typical, but is an interesting aberration and is much more heavily maculated with fuscous spots than variety 4, *maculalis* var. nov. (Plate II, figs. 8 and 9). It shows basal, antemedial, and postmedial bands on the forewings, the buff-colored ground color showing through but faintly on all the wings, especially on the hind ones. I bred a black male imago on July 3, 1901, at Kobe, the larva of which agreed with my original figure of the larva that produced this female aberration; otherwise I might have regarded it as the female of a different species. Subsequent experience at Hako-

date in 1902 and 1903 proved to me the extreme variability of the females of this species as will be perceived by the notes on four varieties. I have taken the young larvæ at Hakodate in October, so that in Hokkaido, where the winter is very severe and lasts for five months, the larva probably hibernates. The pupa is brownish black and is inclosed in a loose-webbed cocoon.

I also bred two males, July 24 and August 2, 1902, respectively, at Hakodate, Hokkaido.

Larva. Purplish fuscous with mixed hairs of whitish and blackish; head ochraceous brown; legs brownish; a yellowish dorsal line with some indistinct irregular lateral lines; tubercles of dorsal half metallic blue; lateral ones ochraceous brown. Food-plants: mulberry-, peach-, pear-, cherry-, apple-tree; *Quercus serrata*; *Q. glandulifera*; &c.¹¹"

The above description of the larva agrees well with my original figure with one exception. In my figure a yellowish midlateral line is represented; perhaps Miyake includes this in "some indistinct irregular lateral lines." Like its near ally, *Diacrisia imparilis*, it seems to be a general feeder.

Imago.—The female of this species is subject to very great variation in the fuscous markings of the fore- and hindwings. In a series of seventeen examples especially selected out of forty-one specimens (most of them captured near Hakodate) with the object of illustrating this variation, no two specimens are exactly alike in markings. Generally speaking, they can be divided into four varieties.

Variety 1 (Plate II, figs. 4 and 5), *immaculalis* var. nov., collection Wileman No. 269. Immaculate; fuscous markings referred to by Hampson¹² in his description entirely obsolete on the upper side of both fore- and hindwings; on the underside the discocellular spot of the forewing and the discoidal spot of the hindwing are faintly perceptible.

Variety 2, unfigured, unnamed. Fuscous markings *very faint*, being faintly present in some specimens on both fore- and hindwings and in other specimens on the hindwings only.

Variety 3 (Plate II, figs. 6 and 7), unnamed, collection Wileman No. 269c. Moderately maculated; the fuscous markings on both the fore- and hindwings are more prominent; two spots, one on subcostal nervure and one on costa of forewing; the commencement of an interrupted antemedial band is represented by four spots, one on the inner margin, one beyond vein 1, one on discocel-

¹¹ Miyake, *Bull. Coll. Agr., Tokyo Imp. Univ.* (1909), 8, 167.

¹² *Cat Lep. Phal.* (1901), 8, 812, ♂ and ♀.

lulars, and one on the costa of forewing. This interrupted antemedial band is more complete in variety 4, *maculalis* (see the following paragraph), in which it is interrupted between veins 3 and 6 at the point where it should bend inward to the costa like the postmedial band.

Variety 4 (Plate II, figs. 8 and 9), *maculalis* var. nov., collection Wileman No. 269e. Heavily maculated; the antemedial band continues nearly to vein 3, where it is interrupted and then continues in two spots, one discocellular and one on the costa; on the hindwing a well-defined, submarginal band of spots, which is continuous in some specimens from inner angle to apex, interrupted in others; discoidal spots very prominent.

A comparison of the immaculate form, var. 1, *immaculalis*, with the heavily maculated form, var. 4, *maculalis*, leads one almost to believe that they are two different species unless in possession of a long series showing the intergrades between the two forms. Taking into consideration the great variability of the female, I think it is unnecessary to give names to varieties 2 and 3.

I have captured *Diacrisia infernalis*, both male and female, in some numbers at Junsai Numa (Junsai Lake), near Hakodate, Hokkaido (Yezo). The female, as also recorded by Miyake, covers the ova with hairs from the anal tuft. The male has a peculiar gyrating flight and on sunny days can be seen careering round the tops of low trees and then suddenly disappearing for a rest. I also found many males (which, like *Diacrisia imparilis*, are blackish brown) in copula with females in the woods about Junsai Numa, lying exposed on the low herbage.

Local distribution.—Honshu: Nikko, Shimotsuke Province, July and August (Wileman); Kobe, Settsu Province, July (Wileman); Myanoshita, Sagami Province, June (Wileman); Oiwake, Shinano Province, 8 males, 1 female in the British Museum collection (Pryer). Hokkaido: Hakodate, Junsai Numa, Oshima Province, July and August (Wileman); Jozankei, near Sapporo, Ishikari Province, August (Wileman). I captured 23 male and 18 female specimens at the above localities in June, July, and August of different years.

Miyake says: "Not very rare in Hokkaido and Hondo; I have received some specimens captured in Tokyo."

Matsumura records the species from Honshu and Hokkaido and says that it is common at Sapporo, Hokkaido.

Time of appearance.—Larva, May to October, hibernates? Imago, June to August. Single-brooded?

General distribution.—Japan only. (Seitz.)

Genus ARCTIA Schrank

Arctia SCHRANK, Fauna Boica (1802), 2, 152.

Arctia caja LINNÆUS.

Plate II, figs. 10 and 11, larva; fig. 12, head; fig. 13, dorsal aspect.
Larva of *Arctia caja* var. ? *phaeosoma* BUTLER.

Japanese names, *hitori-ga*, *odoriko-ga*, *hyo-mushi*.

Bombyx caja LINNÆUS, Syst. Nat. (1758), 1, 500; Esp. Schmiedt. (1789), 3, 167, Pls. 30-32; LERCH, Proc. Zool. Soc. London (1888), 617, No. 179; Trans. Ent. Soc. London (1899), 159, No. 517; STGR., Rom. Mém. Lép. (1892), 278; KIRBY, Cat. Het. (1892), 258; MATSUMURA, Japanese Injurious Insects [Nihon Gaichūhen (Jap.)] (1899), 33, Pl. 14, fig. 1, imago; fig. 2, larva; STGR. and RES., Cat. Lep. Pal. (1901), 1, 368, No. 4201; HAMPSON, Cat. Lep. Phal. (1902), 3, 463; MATSUMURA, Cat. Insect. Jap. (1905), 1, 175, No. 1467; MIYAKE, Bull. Coll. Agr., Tokyo Imp. Univ. (1909), 8, 171; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1911), suppl. 3, 21, Pl. 31, fig. 12, ♀; SEITZ, Macrolep. Faun. Pal. (1910), 2, 98, Pl. 18 b, ♂; OBERTHÜR, Etud. d'Ent., 20, Pls. 13-15, figs. 227-262 (aberr.).

Phalena erinacea RETZ., Gen. Spec. Ins. (1783), 36.

Arctia caja var. *wiskotti* STGR., Hor. Ent. Rom. (1878), 14, 383; SEITZ, Macrolep. Faun. Pal. (1910), 2, 98.

Arctia orientalis MOORE, Ann. & Mag. Nat. Hist. (1878), V, 1, 230; HAMPSON, Moths India (1894), 16.

Arctia americana HARRIS, Rep. Ins. Mass. (1841), 246; in AGASSIS and CABOT, Lake Superior (1850), 391, Pl. 7, fig. 5.

Euprepia phaeosoma BUTLER, Ann. & Mag. Nat. Hist. (1877), IV, 20, 395; Ill. Typ. Lep. Het. (1879), 3, 7, Pl. 42, fig. 10, ♀; KIRBY, Cat. Het. (1892), 259; SEITZ, Macrolep. Faun. Pal. (1910), 2, 98, Pl. 18 b, ♀.

Euprepia phaeosoma var. *auripennis* BUTLER, Trans. Ent. Soc. (1881), 7; MATSUMURA, Cat. Insect. Jap. (1905), 1, 175, No. 1467.

Euprepia opulanta H. EDWARDS, Papilio (1881), 1, 38; KIRBY, Cat. Het. (1892), 259.

Two larvae are figured (Plate II, figs. 10 and 11). One (fig. 11) was taken in August (figured August 22), 1900, at Yoshino, Yamato Province, Honshu, from which no imago was bred, and one (fig. 10) was taken in June (figured June 7), 1902, at Hakodate, Oshima Province, Hokkaido (Yezo). The food plant is unknown, as no notes were taken.

From the larva taken in June, 1902, a male imago emerged August 26, 1902. In this specimen the white markings on the forewings are slender (aberratively reduced) and are for the most part replaced by the brown spots. As the specimen is not at hand, I am unable to say whether it is referable to *phaeosoma* Butler, which is the normal form in Japan.

Larva.—Velvety black; each segment having a number of black shining tubercles, from which proceed very long hairs, those on the dorsal area are

mixed grey and black, those on the 2nd and 3rd segments amber brown; along each side the hairs are of a lighter brown; the spiracles are golden; head legs and claspers shining black."

Wilson counts the head as segment 1. In his figure (fig. 9) the dorsal and lateral hairs on segments 2 and 3 are distinctly amber-brown.

Egg greenish white, larva with very long and dense hair, which is red on the anterior segments and on the others black above and only red laterally, placed on warts with a whitish gloss; when touched roughly the hairs sting slightly, but do not cause any noteworthy inflammation. From September until May, at the edges of woods, on meadows in the woods, on nettles, dandelion and many other low-growing plants. Attempts to breed aberrations by feeding the larvae with certain plants (foliage of walnut, etc.) were not successful. Common.["]

The hair is red on the anterior segments above and on the others black above and only red laterally.

Larva.—Meyr. Brit. Lep. 42; Barrett, Lep. Brit. 268, Pl. 7, fig. 1. Black; hairs very long, black and grey, browner on sides and on 1st and 2nd somites reddish brown; head black. Food-plants: *Urtica*, *Plantago*, etc. 8-5. Great Britain.["]

The hairs on first and second somites are reddish brown.

Larva. Head black with reddish-brown spot at sides; body black; each body-segment with two deep-black tubercles on subdorsal line, one on supra-, subspiracular and basal lines; tubercles on subdorsal and subspiracular lines thickly covered with longer or shorter light greyish yellow hairs; tubercles on subspiracular and basal lines with short reddish brown hair; thoracic legs black; abdominal legs dark brown. Food-plants: hemp, rape, mulberry-tree. *Ribes grossularioides*.—Prof. Sasaki.["] [Nothing is said of segments 2 and 3 (counting head as segment 1) being reddish brown or amber-brown.]

It will be noted that Hampson, Wilson, and Seitz state that the hair on anterior segments 1 and 2 (or counting head as segment 1, on 2 and 3, Wilson) is red, reddish brown, or amber-brown. Sasaki does not notice this, and it is not apparent in the original figures of my larvæ. This is possibly the distinguishing feature of the larva of *phæosoma*, the normal Japanese form of *caja*.

In the original figure of my Hakodate larva (Plate II, fig. 10) the spiracles are white; this is not mentioned by the foregoing authors.

["] Wilson, Larvæ of British Lepidoptera (1880), 64, Pl. 11, figs. 9, 9a.

["] Seitz, Macrolep. Faun. Pal. (1910), 2, 99.

["] Hampson, Cat. Lep. Phal. (1901), 3, 465.

["] Miyake, Bull Coll. Agr., Tokyo Imp. Univ. (1909), 8, 172.

Matsumura ²⁴ records the life history of this species and gives figures of the imago and larva.

He says that in Hokkaido—

It is single-brooded and hibernates in the larval stage. It attains full growth from May to the beginning of June and the imago emerges four or five weeks afterwards. It is extremely abundant both in the larval and imaginal stages at Sapporo, Hokkaido.

Imago.—"In Asia *caja* is considerably larger than in Europe; already in Asia Minor it is larger, with much white on the forewing and the hindwing in the male almost white, this is *wiskotti* Stgr. *Phæosoma* Butler from Eastern Asia is at once distinguished by the white tegulae. In this form, which is the normal one in Japan, East Siberia, Korea and North China, the white may be predominant on the forewing, but may also be aberratively reduced as in European specimens. In East Asia where the larva of *phæosoma* is locally extraordinarily abundant (Greaser), specimens often occur with yellow abdomen and hindwing; this is *gb. auripennis* Butl. In *orientalis* Moore, from Kashomir to the Khasia Hills, the thorax and forewing are more yellowish red-brown, as in certain local worms in North America, where *caja* occurs in some very different varieties (*utahensis*, *opulenta*, *transmontana*)".²⁵

The female type of *auripennis* Butler is from Tokyo, Honshu (*Fenton*), and the female type of *phæosoma* Butler is from Yokohama, Honshu (*Jonas*).

Local distribution.—Honshu. In British Museum collection: Oiwake, Shinano Province (*Pryer*); Tokyo, Musashi Province (*Fenton*), type *auripennis*; Yokohama, Musashi Province (*Jonas*, *Pryer*, *Lewis*), type *phæosoma*; Nikko, Shimotsuke Province (*Maries*). In the Wileman collection: Tokyo and Yokohama, August and September, *phæosoma*? Hokkaido: Shikubi, Oshima Province, August, *auripennis*. Matsumura records *caja* from Hokkaido and Honshu and says that it is very abundant at Sapporo, Hokkaido; he records *auripennis* also from Sapporo.

Time of appearance.—Larva, May and June; imago July, August, and September.

General distribution.—*Arctia caja*.—Throughout Europe and anterior Asia, from Scandinavia, Lapland, and northern Russia southward to the Mediterranean and from the Atlantic Ocean to the Pamir, Kashmir, and even Assam. (Seitz.)

Arctia phæosoma.—Hampson includes *phæosoma* Butl. and *opulenta* H. Edw. under the subspecies *americana* Harris, from North America. Tegulae with a broad white band in front. Abdomen and hindwing scarlet. Japan, eastern Siberia, Korea, North China.

²⁴ Japanese Injurious Insects (Nihon Gaichūhen) (1899), 83.

²⁵ Seitz, Macrolep. Faun. Pal. (1910), 2, 98, 99.

Ab. 1, opulenta.—Forewing with the white markings very extensive and occupying the greater part of wing. Amur and Alaska.

b, americana.—Abdomen scarlet; hindwing yellow. North Atlantic States.

c, auripennis.—Abdomen and hindwing yellow. Japan.

ERRATA IN NOTES ON JAPANESE LEPIDOPTERA AND THEIR LARVÆ,
PARTS II AND III

This Journal Sec. D (1915), 10, No. 5:

Page 284: In line 19 for Honshu read Kyushu.

Page 286: In line 36 for Seib. read Sieb.

Page 293: In line 26 for at Hokkaido read in Hokkaido.

Page 293: In line 29 for Gersan read Gensan.

Page 293: In line 38 for attillia read attilia.

Page 305: In line 20 for ochrace read ochreæa.

This Journal Sec. D (1915), 10, No. 6:

Page 351: In line 12 for schiroseuji read shirosuji.

Page 353: In line 27 for Spirama read Spirama.

Page 353: In line 37 for Hokodate read Hakodate.

Page 354: In line 40 for kohoha read konoha.

Page 357: In line 24 for CHACOSIANÆ, read CHALCOSIANÆ.

Page 360: In line 39 for Yomata read Yamato.

Page 361: In line 1 for Busen read Buzen.

ILLUSTRATIONS

[Drawings by Hisashi Kaidō.]

PLATE I

FIGS. 1 and 2. *Chelonomorpha japonica* Motschulsky.

1, larva; 2, food plant.

3 to 5. *Roscelia mandechuriana* Oberthür.

3, larva; 4, food plant; 5, head and dorsal process.

6 and 7. *Ilema segrota* Butler.

6, larva; 7, pupa and food plant.

8 and 9. *Diacrisia nivea* Ménétries.

8, larva; 9, food plant.

10 to 12. *Diacrisia imparilis* Butler.

10, larva; 11, head; 12, dorsal section.

PLATE II

FIG. 1. *Diacrisia subcarnea* Walker, larva.

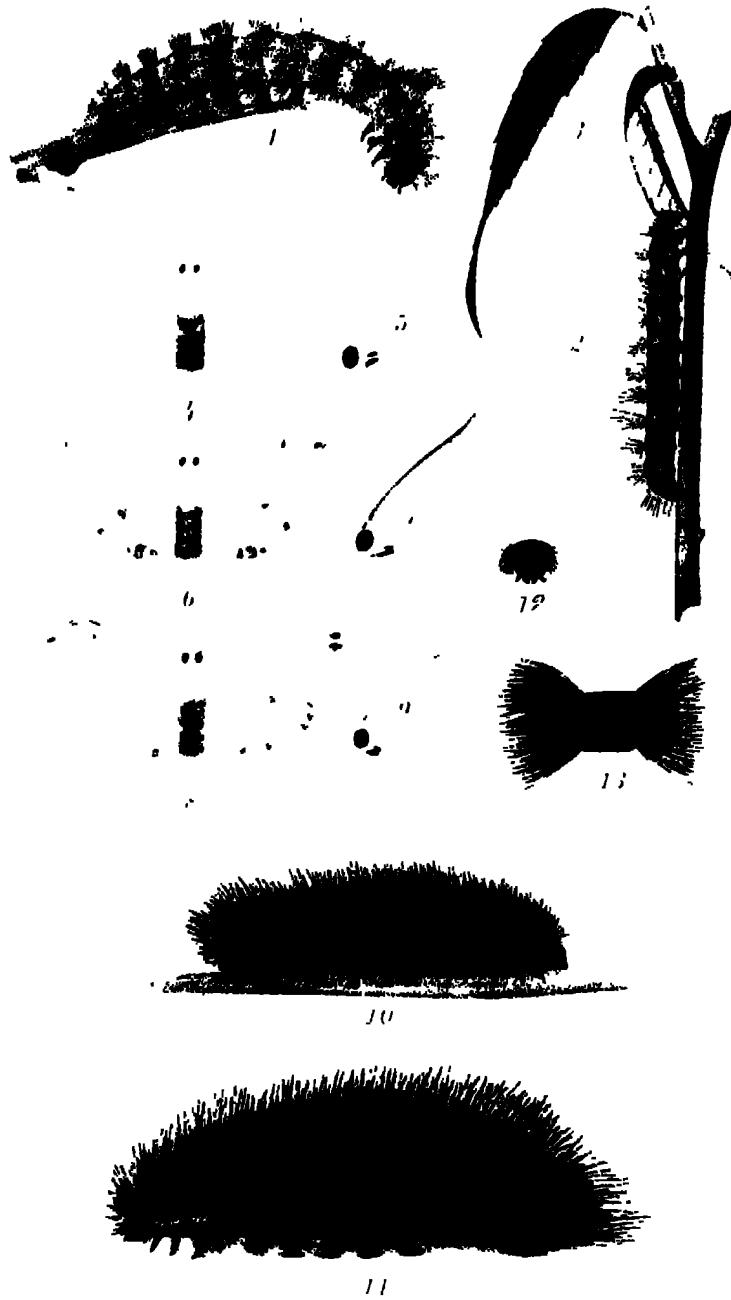
FIGS. 2 to 9. *Diacrisia infernalis* Butler.

2, larva; 3, food plant; 4, imago of variety 1, *immaculata* nov., ♀; 5, head of variety 1, ♀; 6, imago of variety 3, ♀; 7, head of variety 3, ♀; 8, imago of variety 4, *maculalis* nov., ♀; 9, head of variety 4, ♀.

10 to 18. *Arctia caja* var. ? *phasosoma* Butler.

10 and 11, larva; 12, head of larva; 13, dorsal aspect of larva.

PLATE I CHELONOMORPHA JAPONA, ROSELIA MANDSCHURIANA, ILEMA AEGROTA
DIACRISIA NIVEA, AND D IMPARILIS.

PLATE II DIACRISIA SUBCARNEA D. INFINALIS AND ARCTIA CAJA VAR. ?
PHAEOSOMA

FOURTH CONTRIBUTION TO THE COLEOPTERA FAUNA OF THE PHILIPPINES

By W. SCHULTEE
(Manila, P. I.)

ONE PLATE

This paper is mainly an addition to the knowledge of the pachyrrhynchid group of the Curculionidae found, with a very few exceptions,¹ in the Philippine Islands.

CERAMBYCIDÆ

Aoronia pretiosa sp. nov. Plate I, fig. 1.

Head: clypeus and mandibles black, frons and vertex dark blue, with irregularly scattered needle punctures and a fine medial groove. A creamy white transverse stripe at the base of the clypeus, continued on the sides of the head. Two oblique stripes arise at the middle from the base of the clypeus, run just above the eye, and terminate on the vertex. These two stripes form the letter V. Antennæ bluish black, basal half of second and third joints creamy white. Thorax dark blue with a metallic luster. Two transverse bands, one next to the anterior and the other next to the posterior margin, joining a lateral marginal stripe, both the former bands interrupted in the discal area. Sides and underside of thorax, abdominal segments, and femora glossy metallic green. Elytra dull bluish black, remotely and regularly punctured, but the basal area coarsely and confusedly punctured. A transverse band, at the end of the basal third of the elytra, to the outer margin, another transverse band at the end of the second third, running obliquely behind to the

¹ Non-Philippine species known so far are the following: *Pachyrrhynchus croesus* Oberth., Sanghir Island; *P. forsteni* Vollh., Ternate, Halmahera, and Sumatra; *P. infernalis* Fairm., Ishigaki-Sima Island; and *P. morotaiensis* Vollh., Morotai. In 1912 Professor Heller published in This Journal his very commendable paper, Philippinische Rüsselkäfer. In the same he included in the keys, also, the above-mentioned non-Philippine species, without calling attention to that fact, except in the case of *P. morotaiensis* Vollh. Through an oversight, I included also the above-named species in my Catalogue of the Philippine Coleoptera, which mistake I wish to correct herewith.

outer margin. The central area, which is inclosed by the transverse bands, has a whitish opalescent aspect.

A short longitudinal and slightly curved stripe from the middle of the base of each elytron, but not reaching the first transverse band. Also from the base to the second transverse band a narrow sutural stripe and in the apical third of each elytron an anteriorly forked subsutural stripe, which is recurved in the apical triangle toward the outer margin and joins the second transverse band. The suture is apically slightly raised. Each femur, with two tomentose spots. Tibia dull dark blue and finely bristled above apically. First abdominal segment with a band at the fore margin. Outer margin of all abdominal segments and the last segment almost entirely creamy white tomentose. The latter with a longitudinal medial groove, a character that is also found in the genus *Aprophata*.²

Length, 18 millimeters; width, 7.

CATANDUANES, Virac. Type in my collection.

The type of the genus *Acronia* is *perelegans* Westwood,¹ also from the Philippines; Luzon, Tayabas Province, Casiguran (*Semper*).

CURCULIONIDÆ

Pachyrhynchus sumptuosus sp. nov.

Head, thorax, legs, and underside glossy black, with a coppery luster. Elytra dull glossy, iridescent purplish brown or green. Rostrum finely and sparsely punctured, a prominent pitlike depression in the basal half. In the depression a rather indistinct longitudinal groove. Thorax with an indistinct groove near the fore margin, laterally only. Hind margin raised. Female with a group of very minute bronze-green scales at the lateral margin. Each elytron with a row of punctiform impressions near the outer margin, extending from the middle to the apex. In the apical part these depressions run together, forming a groove.

¹ I described in *This Journal, Sec. D* (1916), 11, 348, *Abryna* ? *hoffmeisteri*, placing the species provisionally in the above-mentioned genus, following Westwood's conception. The species *hoffmeisteri* Schultze should be placed in the genus *Aprophata*. Furthermore I find that *A. hoffmeisteri* is identical with *A. ruficollis* Heller. *Deutsche Ent. Zeitschr.* (1916), 308. Through the kindness of Professor Baker I received a reprint of Heller's paper, but from it I am unable to state the date of publication and whether the former (issued January 3, 1917) or the latter specific name will have priority.

My copies of the *Deutsche Entomologische Zeitschrift*, as well as those for the library of the Bureau of Science, Manila, are evidently being held up or lost.

² Westwood, *Trans. Ent. Soc. London* (1868), III, 633; Pl. 24, fig. 4.

Femora with a strongly excavated depression below, apically. At the depression minutely fine scales and hair. Tibia below very minutely denticulate and beset with fine hair.

Male, length, 12.5 millimeters (without rostrum); width, 5. Female, length, 16 millimeters (without rostrum); width, 7.

Luzon, Bontoc. Types in my collection.

This species is easily recognized by the very peculiar coloration of the elytra.

Pachyrhynchus igorota sp. nov. Plate I, fig. 2.

Dull glossy, black. Rostrum apically broader than at the base. Apical area densely punctured. Rostrum transversely set off at the middle, posterior of which a deep depression, the lateral edges of which are strongly produced. A creamy white scale spot posterior of the antennal groove. Thorax as long as broad. Laterad of the middle an irregular spot composed of a few scales and posteriorly of the latter at the hind margin a wedge-shaped spot. A longitudinal lateral facia from the fore to the hind margin. Each elytron with three narrow creamy white stripes: One from the base straight across the disk to the apex; another laterad, beginning a short distance from the base and terminating a short distance before the apex; and another broad outer marginal stripe arising similarly some distance from the base and terminating before the apex. Pro- and mesosternum with a triangular spot between the coxae, the latter also with a spot laterad. Metasternum and first abdominal segment with a lateral spot only. Femora with a spot on the underside near the apex.

Male, length, 18 millimeters (without rostrum); width, 7. Female, length, 20 millimeters (without rostrum); width, 8.5.

Luzon, Benguet, Haight's Place (2,700 meters). Types in my collection.

The males of this species have the spots on the thorax mostly very much reduced or entirely absent. Also the stripes on the elytra, with the exception of the one on the lateral margin, are sometimes interrupted in the middle. In one specimen the second stripe is reduced to one fourth of the normal length, basally. This species is mostly covered with a sticky substance, so that it is very difficult to obtain perfectly clean specimens. Whether this is due to a kind of natural perspiration or to certain peculiarities of the food plant with which the insect comes in contact, I am unable to say at the present. Through my native collector, as well as through the kindness of Messrs. C. Hoffmeister and O. Schütze, I received a large number of specimens, all from

the above-mentioned locality.* It seems that the range of this species is very limited. This species is closely related to *P. modestior* Behr., but is easily distinguished from the latter by the usually larger size, the narrower stripes on the elytra, and the absence of a spot between the eyes. The color of *P. modestior* is mostly dark glossy green, but in all the specimens of *P. ignorata* that were examined, the color is dull glossy black.

Pachyrrhynchus loheri sp. nov. Plate I, fig. 3.

Glossy black, elytra with very broad, light green, longitudinal scale stripes. Rostrum comparatively short, transversely set off and emarginate in the middle. Apical part densely punctured, in the basal part a deep depression with a scale spot, the lateral edges prominently produced. Frons with a punctiform impression. Thorax longer than broad. A broad band at the anterior margin, which narrows toward the sides, but continues to the hind margin where it terminates laterad in a shallow depression. Hind margin dorsad with a broad band composed of two elongated closely approximated spots. Somewhat behind the middle, laterad, a shallow depression with a nearly round scale spot. From the latter to the posterior margin a slightly raised keel. Elytra cordiform, broadest before the middle. Each elytron with five longitudinal stripes, which are broader than the interspaces, except the sutural stripes. The latter begin before the middle, becoming somewhat narrower and again broader toward the apex. The second stripe unites with the marginal near the apex. The interspaces are somewhat elevated. Abdominal segments finely wrinkled like leather and with a few scattered scales. Each femur with a spot near the apex, antad.

Length, 18 millimeters (without rostrum); width, 8.

Luzon, Bulacan, Mount Guinuisan (*A. Loher*). Type in my collection.

This species is to be placed in Heller's group II.*

Among the other species of this group *P. loheri* is easily recognized by the cordate elytra.

* The mountainous regions of central and northern Luzon appear to be the ancestral home of the *Pachyrrhynchus-Apocyrus* groups, since by far the most species of these groups, known from the Philippines, are found in the indicated regions, and many more will be discovered in the vast yet unexplored areas. For example, at Baguio (altitude, about 1,500 meters) and close neighborhood the following species of *Pachyrrhynchus* are found: *Pachyrrhynchus annulifer* Hell., *annulatus* Chevr., *argus* Pasc., *coeruleans* Kraatz, *congestus* Pasc., *pulchellus* Behr., *sanchezi* Hell., and *zebra* Schultze, besides several other species not yet identified.

* *This Journal, Sec. D* (1912), 7, 305.

Pachyrrhynchus schuetzei sp. nov. Plate I, fig. 7, ♀.

Black, with a coppery gloss and numerous yellowish white scale ringlets. Rostrum set off transversely in the middle. On the basal part a small, double, scale spot divided by a longitudinal groove. The latter terminates between the eyes and is somewhat shorter, as in *P. anellifer* Heller. Thorax a little broader than long. Anterior and posterior margin with a fine scale line. A shallow, longitudinal, middle groove along which a few scales are located. In the middle, but laterad, a shallow dimplelike depression surrounded by a ring of scales. At the lateral margin a group of a few scales. Elytra with irregular rings of scales in transverse rows. The first row parallel to the basal margin, each elytron having three large oval rings and four smaller spots. The spaces within the large rings are frequently filled with scales. In the first row the location of the spots is as follows: a small dotlike spot next to the suture, two larger ones in the middle, a few small ones, again one larger, and a small one at the lateral margin. The second row runs about parallel to the first row, each elytron with four larger and next to the lateral margin a few small spots. A third interrupted row, composed of two rings on each elytron, is located at the beginning of the apical third thereof. Between the second and third rows, as well as in the apical area of the elytron, a subsutural double spot, the latter being rather long and narrow. In the apical triangle a large, irregular, triangular spot. Scattered among different larger rings of the elytra are a number of scaly dots. In the male the elytra are not so glossy as in the female; in the former they have very slight indications of longitudinal furrows, and the spots are more dotlike.

Male, length, 11 millimeters (without rostrum); width, 5. Female, length, 14 (without rostrum); width, 6.

Luzon, Benguet, Haight's Place (*O. Schultze*). Types in my collection.

This species has a superficial resemblance to *P. anellifer* Heller, but I have numerous specimens of both species before me and there are no intermediate forms among them. The differences between the two species seem to be very constant. It appears as if *P. annulatus* Chevr., *P. anellifer* Heller, and *P. schuetzei* are closely related species, which represent, so to say, transitional stages of their evolution.

Pachyrrhynchus zebra sp. nov. Plate I, fig. 5.

Black, with longitudinal, light bluish or greenish scale stripes. Rostrum with a deep pitlike depression in the middle, which

disperses between the eyes. Frons with a fine medial groove and an elongated spot not continued on the vertex. Thorax smooth and shiny. A narrow band on the fore margin continued laterally to the hind margin. A lateral medial band joins the side marginal stripe. From the disk of the thorax arising from the lateral band, a longitudinal stripe to the posterior margin, forming the letter T. Elytra very finely wrinkled like leather with very pronounced longitudinal puncture rows. Each elytron with four longitudinal stripes, which run together at the basal margin and in the apical triangle. A narrow subsutural stripe in the apical half of each elytron not quite reaching the apex. The broadest stripes are the one located between the second and third rows of punctures and the lateral marginal stripe, both of which are also broader toward the base and toward the apical triangle. Underside with a spot on the meso- and the metasternum. First abdominal segment with a large spot on either side. Each femur with a scale spot in the middle and a ringlike spot near the apex.

Length, 11.5 millimeters (without rostrum); width, 5.5.

Luzon, Benguet, Mount Santo Tomas (*W. Schultze*). Type in my collection.

This species belongs to Heller's group V.⁶

Eupachyrhynchus hieroglyphicus sp. nov. Plate I, fig. 4.

Female.—Black, each elytron with four greenish or bluish white longitudinal stripes. Rostrum comparatively broad, strongly and confusedly punctured at the apex. A prominent quadratic depression in the basal half, the lateral edges of which are strongly keeled. Inside of the depression a fine longitudinal groove, extending to the frons. Thorax with a narrow transverse spot laterad of the middle, another larger one at the base, and a still larger spot on the lateral margin. Elytra with irregular longitudinal rows of punctures. Each elytron with four stripes. The dorsal pair at the base interrupted, forming two spots, afterward combined and at the disk separated again, forming a peculiar loop posterior of which the stripes approach each other and separate again, forming a second loop at the hind slope. Another, rather wavy lateral stripe and another, the broadest stripe, near the outer margin. The two latter run together at the base, and all four stripes are confluent in the apical triangle. The striped areas are very distinctly depressed. Suture and costal margin apically with a few fine hairs. Apical

ends of the elytra acutely divergent. Legs sparsely and indistinctly punctured, beset with fine hair, especially the tibia.

Length, female, 16.5 millimeters (without rostrum); width, 7.75.

Luzon, Benguet, Baguio. Type in my collection.

Macrocyrtus ? *benguetanus* sp. nov. Plate I, fig. 8, ♀.

Dark brown, almost black. Rostrum shagreened and irregularly punctured, fine hair arising from the punctures. A moderate longitudinal depression which is continued between the eyes as a fine groove to the vertex. Bronze-green scales scattered over the punctured area of the rostrum and frons. Antennæ beset with fine white hair, first funicular joint the longest, second almost as long as the first, the following short, each about one third the length of the second joint. Thorax sparsely punctured, with a prominent median and a rather indistinct anterior marginal groove. The punctuation in the female obsolescent. A broad bronze-green dorsolateral fascia from fore to hind margin interrupted cephalad, thus forming a small nearly round spot at the margin. A similar ventral-lateral fascia, certain scales of which extend to the margin of the acetabula. Elytra strongly punctured in irregular longitudinal rows, in the female strongly suffused. Each elytron with three longitudinal fasciae, two of which are dorsolateral, the other at the outer margin. The same are irregularly interrupted before and behind the middle, forming irregular spots, the basal and the apical spots being the largest. Elytra beset with fine, scattered hair, especially toward the costal and apical margin. Legs reddish brown and hairy. Fore tibia only, below, with fine tubercles or blunt teeth. Apical ends of the elytra of the male acutely rounded, in the female acutely divergent.

Male, length, 10 millimeters (without rostrum); width, 3.5. Female, length, 12 (without rostrum); width, 5.

Luzon, Benguet, Mount Santo Tomas (2,250 meters). Types in my collection.

Var. montanus nov. Plate I, fig. 9, ♂.

Castaneus brown. Rostrum with the longitudinal depression less pronounced than in the typical form. Thorax with the median groove almost absent. The fasciae very broad, especially on the elytra. Legs red, the apical half of the femora and the tarsi dark brown.

Luzon, Benguet, Haight's Place (2,700 meters).

The species *benguetanus* I place for the present provisionally

in the genus *Macrocyrtus*, which includes already some generically rather different species that should be rearranged when more is known about the group. The latter contains so far the species *nigrans* Pasc., *castaneus* Pasc., *subcostatus* Heller, *negrito* Heller, and *erosus* Pasc. The last-mentioned species is quite different in general appearance and form from the first four species, the main difference being that the elytra of the former are depressed dorsally, whereas in *erosus* Pasc. the elytra are inflated more as in *Pachyrhynchus*. *Macrocyrtus negrito* Heller represents an intermediate form.

Nothapocyrthus luzonicus sp. nov. Plate I, fig. 6.

Castaneus, very glossy. Rostrum with irregular and scattered punctures. A large, shallow depression and an indistinct longitudinal groove terminating between the eyes. Thorax finely and irregularly punctured, with a large light green or bluish scale spot at the lateral margin. Elytra with distinct longitudinal rows of punctures. Each elytron with four lapis lazuli colored spots, as follows: Two at the base, one of which is near the suture, the other at the lateral margin; another long and narrow spot apically at the lateral margin; and one in the apical triangle. Besides the above-mentioned spots are indications of another, in the female only, at the lateral margin before the middle. Female with the suture apically strongly elevated and the sutural ends dull-pointed, in the male the latter are evenly rounded. Meso- and metasternum with a scale spot laterad. Metasternum and first abdominal segment of the male with a longitudinal depression in the middle. Legs with fine scattered punctures, a hair arising from each puncture.

Male, length, 11 millimeters (without rostrum); width, 4.5. Female, length, 12 (without rostrum); width, 5.

Luzon, Benguet, Haight's Place. Types in my collection. I place this species provisionally in the genus *Nothapocyrthus* Heller, since *luzonicus* is congeneric with *N. cylindricollis* Heller.

Artapocyrthus sexmaculatus sp. nov. Plate I, figs. 11, 11a.

Glossy black, related to *A. quadriplagiatus* Roel., but the ventral side of the rostrum not armed with the conical projection as in the latter species. Rostrum densely punctured, a medial groove on the basal half reaching to the frons between the eyes. A prominent, deep transverse groove at the base of the rostrum. Underside of rostrum (Plate I, fig. 11) somewhat resembling that of *A. pardalis* Heller. Thorax equal in length and width,

globular, and with fine, scattered punctures. The female only has a flat depression with fine transverse wrinkles somewhat anterior of the hind margin in the discal area of the thorax. In the middle of the lateral margin a very light pinkish white scale spot of about double the size of the eye. Elytra irregularly punctured in rows, the puncture rows next to the outer margins running together, groovelike. Each elytron with 2 (δ) or 3 (φ) lateral pinkish white scale spots, one of which is located at the base and the other at the beginning of the apical third. The female has besides the above-mentioned spots another small one in the discal area between the second and third rows of punctures. Still another is more or less indicated at the margin in the apical part of the elytra. Anal segment of the female with two longitudinal impressions as in *A. pardalis* Hell.

Female, length, 11.5 millimeters (without rostrum); width, 5. Male, length, 10.5 (without rostrum); width, 4.5.

CATANDUANES, Virac. Types in my collection.

Metapocyrus carinatus sp. nov.

Black. Rostrum strongly coriaceous, with a prominent longitudinal groove. The former triangularly set off between the eyes. Frons also coriaceous. Vertex smooth. Antenna finely pilose, especially the club, scape reaching slightly beyond the fore margin of the thorax. First funicular joint double the length of the second, each of the following joints half as long as the second (and equal among themselves). Thorax strongly coriaceous, with a marginal groove posteriorly only. Elytra prominently carinate, the interspaces with a coriaceous appearance. Elytra of the female with a large pubescent sutural tubercle at the posterior slope and an apical protuberance forming a short thornlike projection. Elytra of the male normally developed. Legs less pronounced coriaceous and beset with silvery gray hair, especially the tibiae and tarsi. Hind femora of the female reaching beyond the apex of the elytra, hind femora of the male extending nearly half of their length beyond the elytra.

Male, length, 9 millimeters (without rostrum); width, 2.75. Female, length, 10 (without rostrum); width, 3.5.

Luzon, Benguet, Haight's Place (2,700 meters). Types in my collection.

This species seems to be related to *M. cylas* Hell.,¹ assuming that Heller's description refers to a male.

¹ This Journal, Sec. D (1912), 7, 359.

Metapocyrus furcatus sp. nov. Plate I, figs. 10, 10a, ♀.

Black with large light green scale spots. Rostrum in the apical part minutely, confusedly punctured. A well-pronounced longitudinal depression expanded toward the front and terminating between the eyes. The punctuation in the broad portion of the depression or groove and up to the frons strong and confused. From the puncture arise very fine hairs. A large scale spot between the eyes. Sides of the head similarly scaled. Thorax longer than broad, strongly and confusedly punctured. A large, lateral, oblong scale spot and a broad fascia above the hips extending from the anterior to the posterior margin. Elytra irregularly punctured in rows. Female with seven large scale spots on each elytron. A prominent and finely bristled and scaled sutural double tubercle at the beginning of the hind slope of the elytra. Sutural end of each elytron drawn out thornlike and bent outward, forming a fork-shaped appendix. Male without the above-mentioned double tubercle and the sutural ends of the elytra uniformly rounded. The spots in the female are located as follows: Two oblong oval spots at the base, one subsutural, the other outer marginal, another, the smallest subsutural spot, at the disk. Still another subsutural oblong oval spot at the hind slope and next to the tubercle. An irregular triangular spot at the apical area. Another large oblong marginal spot scarcely separated from that in the tip triangle, and a large somewhat rectangular spot, which is located laterad to the small one at the disk and runs obliquely caudad. The spots vary, some are joined, others are divided, the latter being generally the case in the male. Legs beset with fine silver grayish hair. Tibia below with a few fine teeth and more strongly haired. Thorax below and abdominal segment similarly finely hairy.

Male, length, 8 millimeters; width, 2.5. Female, length, 10; width, 3.5.

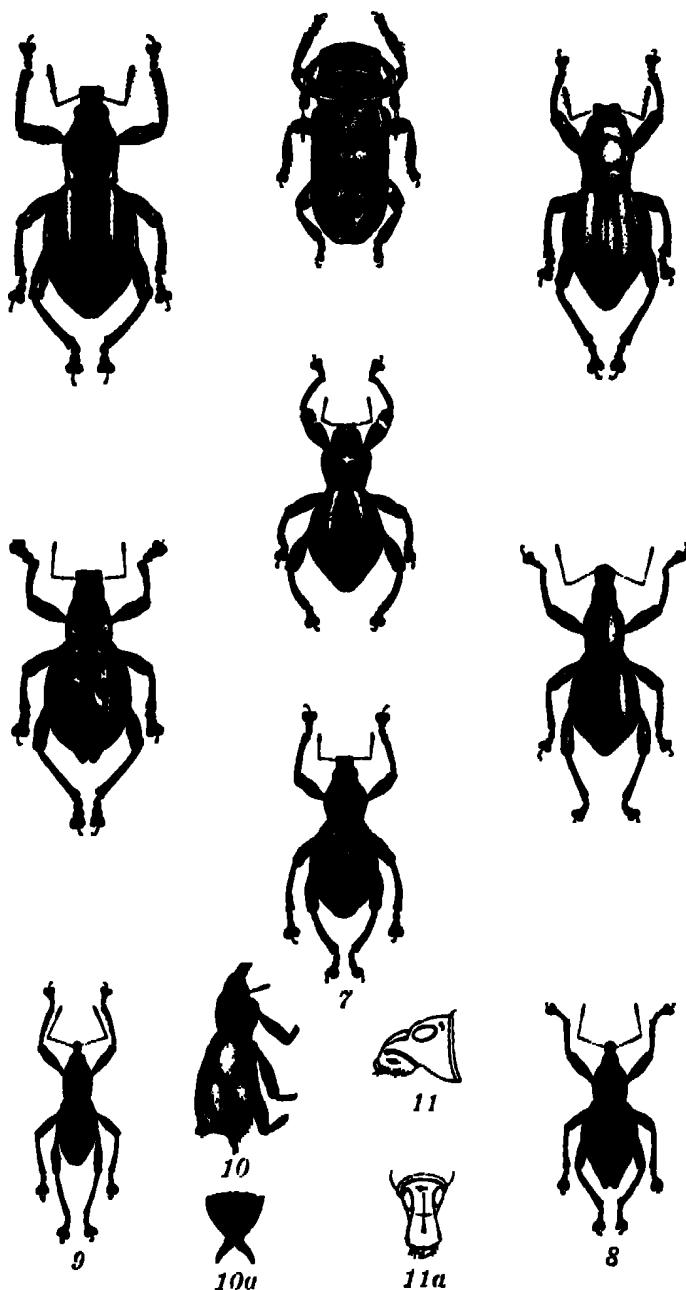
Luzon, Benguet, Mount Mirador (W. Schultze). Types in my collection.

The male of this species has a superficial resemblance to *Notapocyrus alboplagiatus* Heller. The female is to be recognized at once by the peculiar forked sutural apical ends of the elytra (Plate I, fig. 10a).

ILLUSTRATIONS

{Drawings by W. Schultze}

- FIG. 1. *Acronia pretiosa* sp. nov. $\times 1.5$.
2. *Pachyrrhynchus igorota* sp. nov. $\times 1.5$.
3. *Pachyrrhynchus loheri* sp. nov. $\times 1.5$.
4. *Eupachyrrhynchus hieroglyphicus* sp. nov. $\times 1.5$.
5. *Pachyrrhynchus zebra* sp. nov. $\times 2$.
6. *Nothapocyrthus luzonicus* sp. nov. $\times 2$.
7. *Pachyrrhynchus schultzei* sp. nov. $\times 2$.
8. *Macrocyrtus benguetanus* sp. nov. $\times 1.5$.
9. *Macrocyrtus benguetanus* var. *montanicus* nov. $\times 1.5$.
10. *Metapocyrthus furcatus* sp. nov. $\times 2.5$; 10a, dorsal view of apical area.
11. *Artapocyrthus sexmaculatus* sp. nov., lateral view of head; 11a, front view of head.



REVIEWS

The Fundus Oculi of Birds | especially as viewed by the | Ophthalmoscope | A study in | comparative anatomy and physiology | by | Casey Albert Wood | Illustrated by 145 drawings in the text; also by sixty-one | colored paintings prepared for this work by | Arthur W. Head, F. Z. S. | London | Chicago | The Lakeside Press | 1917 | Cloth, pp. 1-182. Price, \$15.00.

The *Fundus Oculi of Birds* is evidently a work of love, a byproduct in the life of a busy professional man, the utilization of the skill of the oculist in the study of a specialized branch of ornithology.

The author clearly shows the difficulty involved in the production of a work such as he has given us the pleasure of reviewing. As he says (p. 36) :

The ophthalmologist may be a good observer but a poor artist; conversely, an expert in the use of brush and pencil may not be sufficiently conversant with normal and pathological, human and comparative ophthalmoscopy and ophthalmology to enable him to make an intelligent use of his artistic talents.

Fortunately Doctor Wood has been able to combine his own technic with the rare artistic experience and ability of Mr. A. W. Head, and thus to present a wonderful collection of colored pictures of the fundus oculi.

Following the Introduction and Summary of Conclusions the chapters deal with collection, selection, and preparation of material and bibliography; anatomy of the fundus organs in birds; ophthalmoscopy of the vertebrate eye; ophthalmoscopy of the fundus in living birds; fundus oculi of birds in prepared specimens; effects of domestication on the fundus oculi; the fundus appearances in various orders of birds; classification of the ocular fundi of birds; classification of Aves and the fundus oculi, and the relations of reptilian to avian fundi.

The fundus oculi of birds, in simple words, is the posterior wall of the eye, and as seen through the pupil in the living bird by means of the ophthalmoscopy, it presents a picture entirely different from that seen in the eye of any other vertebrate. Doctor Wood has examined the eyes of representatives of nearly all the avian orders and

believes that as the fundus appearances in wild species are probably invariable and that, as the evidence so far produced shows, each species

exhibits a background picture distinct in one or more particulars from every other species, it is possible to identify many of them by the use of the ophthalmoscope alone; * * *. [p. 114.]

Colored plates show that there is much difference in the fundus of different genera, but in only one case has the author illustrated the fundi of two species in the same genus, namely, *Haliaetus leucocephalus* and *H. leucogaster*, illustrated on plates 33 and 34, respectively. The ocular fundi of these two species seem to be somewhat similar to each other, but that of the latter seems to be more similar to the fundus of *Tinnunculus alaudarius*, plate 35, than to the fundus of *H. leucocephalus*. Doctor Wood says (p. 115) :

The arrangement of the centres of distinct vision, the fundus tints and the pectinate tissues of the larger *Accipitriformes* present a decided ophthalmoscopic resemblance in all the species so far examined by the writer.

A series of plates illustrating the fundi of half a dozen or more species in one genus would be interesting. With regard to characteristic colors of the fundus, Doctor Wood says (p. 114) :

When a bird and his ancestors (in the evolutionary sense) have used their eyes for distinct visualization largely or exclusively at night the fundus tint is nearly always yellow or orange.

Another observation of avian fundi seems to show that an admixture of yellow (in the form of an orange-red coloration) may be present to indicate not so much recent as former, i. e. atavistic, night habits long since abandoned by the species.

This almost universal occurrence of yellow or orange-tinted fundi in Night Birds leads one to speculate as to the cause of a different coloration in species that, during historic times at least, have used their eyes largely or exclusively after dark. At least some of the *Ardeiformes* furnish such examples.

The paper, type, press work, and binding of this book are such as to produce a pleasing and satisfactory volume.

R. C. McG.

Heredity in Relation to Eugenics | by | Charles Benedict Davenport | [5 lines] | [ornament] | New York | Henry Holt and Company | 1913 | Cloth, pp. i-xi+1-298.

Heredity in Relation to Eugenics is a most welcome contribution to the literature of the subject, not only because of the many facts presented, but also because of the clear, sound, and temperate analysis which the author has made of them. What is given here is no more than a brief abstract of this book, and it should be said that the work is an excellent one for those who are interested in the subject, as it covers the field in an adequate manner and avoids those severely technical discussions that

are difficult of comprehension by the ordinary reader, as well as theories that are not widely accepted.

There is a general impression that books upon heredity are gloomy and pessimistic; that they teach that the deficiencies of the parents are inevitably inherited by the children; and that as acquired characteristics are not transmitted there is no chance for mental, moral, or physical improvement. According to this idea, since the career of each individual would be predetermined from his birth, there would be no room for free will, all striving for improvement would be useless, and the very foundations of ethics and of religion would be undermined.

Doctor Davenport's presentation of the subject is distinctly hopeful, as it makes clear that only mental and moral tendencies are usually inherited, and that these can be inhibited, cultivated, and modified, within certain limits, by training, formation of habits, and education. Social environment and deliberate choice and effort are factors that may improve many individuals, though there are persons of the lower types who are not able to advance themselves consciously. Thus the underlying conviction of most thinking people that the larger number of individuals are responsible for their acts is shown to be well founded, and heredity takes its place with environment as one of the factors influencing conduct, instead of being an overmastering power against which it is useless to struggle.

Notwithstanding this encouraging attitude, the author maintains, in no equivocal terms, the commanding importance of eugenics, which he defines as "the science of the improvement of the human race by better breeding," and he even goes so far as to say: "Man is an organism—an animal; and the laws of improvement of corn and of race horses hold true for him also. Unless people accept this simple truth and let it influence marriage selection human progress will cease."

The expense in the United States of caring for the insane, the feeble-minded, criminals, and other defectives shows an enormous and disproportionate increase from year to year and has led some writers to deplore the undue sentimentality of modern society in encouraging the multiplication of the unfit, who otherwise would have been eliminated. The statement is made that one fifth of the total revenues of some states in the United States is devoted to the care of the unfit, and that we support about half a million insane, feeble-minded, epileptic, blind, and deaf persons, with, in addition, 80,000 prisoners, and 100,000 paupers, at a cost of over 100,000,000 dollars a year. Besides this stag-

gering total, there are many other defectives, who are not in institutions and who are a constant menace to society.

Davenport's views on the question of the best methods of diminishing the transmission of undesirable physical and mental traits are perfectly definite. After discussing the sterilization of the unfit from various points of view, he concludes that the lower grades should be segregated in institutions, while the nearly normal people should be educated as to fit and unfit matings.

This is one of the few subjects that he has not treated in a satisfactory manner, as many persons might feel that his own tables could be easily interpreted to confute the author's conclusions as to the social expediency of the marriage of the higher grades of the mentally defective, while the expense of the proposed adequate segregation would be prohibitive.

However, he is not unaware of the logical deductions from his presentation of the facts, for he writes, "There is no question that if every feeble-minded, epileptic, insane, or criminalistic person now in the United States were operated on this year there would be an enormous reduction of the population of our institutions 25 or 30 years hence; * * *."

A more complete discussion of the relation of drunkenness to defectiveness would add to the usefulness of the book, as some authors regard alcoholism as the cause of deficiency, while almost all feel that the two are very intimately related. Therefore it may be desirable to include drunkards in the list of those who should not be permitted to burden society with their progeny.

Apparently the author's sympathy for the individuals who are less favored by nature tends, in this instance, to outweigh the interests of society, and he may possibly place too much importance upon the usefulness to society of the offspring of the high-grade defectives.

On the other hand, he emphasizes the importance of proper marriage in the words "proper matings are the greatest means of permanently improving the human race—of saving it from imbecility, poverty, disease, and immorality."

The section on the sociological aspect of eugenics is of especial interest, for his explanation "the traits of the feeble-minded and the criminalistic are normal traits for infants and for earlier stages in man's evolution" gives an additional instance of the biological truth that "the individual (*ontos*) in its development passes through stages like those the race (*phylum*) has traversed in its evolution." We are forced "to conclude that these traits have come to us directly from our animal ancestry and have

never been got rid of" by those whom we class as defectives, and who in many cases are merely instances of arrested or imperfect development. The universal processes of evolution tended to eliminate those individuals who were not adapted to their environment, and so society gradually freed itself from un-social strains by the simple process of the imprisonment or execution of those individuals who were a menace to the welfare of their fellows. The author faces the situation with courage and does not hesitate to say (p. 263) :

We are horrified by the 223 capital offenses in England less than a century ago, but though capital punishment is a crude method of grappling with the difficulty it is infinitely superior to that of training the feeble-minded and criminalistic and then letting them loose on society and permitting them to perpetuate in their offspring these animal traits. Our present practices are said to be dictated by emotion untempered by reason; if this is so, then emotion untempered by reason is social suicide. If we are to build up in America a society worthy of the species *man* then we must take such steps as will prevent the increase or even the perpetuation of animalistic strains.

The deductions of heredity give little support to those philanthropists who think that all criminals are merely the victims of social injustice and that the children of criminals will always make good citizens if placed in a proper environment. The pedigree of the Juke family, which up to 1877 had cost New York State over 1,250,000 dollars, and is still multiplying, and those of the "Ishmaelities," Owens, and many other families show that defective parents will almost inevitably have defective offspring. Many instances are given of children with defective ancestry, but with excellent surroundings from an early age, who have proved incorrigible.

In support of these various conclusions, Davenport gives a logical and well-arranged discussion—though it is possibly too condensed—illustrated by many tables of the method and mechanics of heredity, covering the fertilization and multiplication of the germ cells, the transmission of determiners and unit characters, and the Mendelian theories of the inheritance of dominant and recessive characters.

One of the best bases for the study of the interaction of these factors is the inheritance of family traits, since we have here available a considerable number of facts regarding the transmission of the color of the eyes, hair, and skin; the energy, stature, weight, form, and peculiarities of the body; the appearance of mechanical, mathematical, mental, literary, musical, and artistic ability; and the susceptibility to various diseases of the

nervous, muscular, vascular, alimentary, and respiratory systems, as well as to maladies of the eyes, ears, skin, glands, and blood. The list is astonishingly long, and the evidence is abundant. The studies of feeble-mindedness, insanity, pauperism, and criminality are especially convincing.

Chapters are also devoted to the geographic distribution of inheritable traits and to migrations and their eugenic significance. Of special interest is the chapter on the influence of the individual on the race.

The author closes with a strong plea for a thorough study by the various States, by means of eugenic surveys made by the school teachers, of all their families, for the purpose of recording the good and the bad traits of each strain, with a view of eliminating the latter. He feels that society has a right to this information, in spite of the unwillingness to give it that may be felt by individuals, and he meets the objection that such a survey is impracticable by the assertion that a similar one is well advanced in New Jersey, largely through private initiative, by means of field-workers attached to various institutions for defectives. He also thinks that there should be a national clearing house to collect the information collected by the various states.

C. C. BATCHELDER.

Truth | and | Other Poems | by | Paul Carus | [cut] | Chicago | The Open Court Publishing Company | MCMXIV | Cloth, pp. 1-61. Price, \$1.

The | Mutation Theory | Experiments and Observations | on the | Origin of species in the Vegetable | Kingdom | by | Hugo de Vries | professor of botany at Amsterdam | translated by | Prof. J. B. Farmer and A. D. Dabishire | Volume II | The origin of varieties by mutation | with numerous [text] illustrations and six colored plates | Chicago | The Open Court Publishing Company | London agents | Kegan Paul, Trench, Trübner & Co., Ltd. | 1910 | Cloth, pp. i-viii+1-682. Price, \$4.

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BRACHYMELES, A GENUS OF PHILIPPINE LIZARDS

By EDWARD H. TAYLOR

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ONE PLATE AND SEVEN TEXT FIGURES

The genus *Brachymeles*, as here understood, is the same as defined by Boulenger;¹ that is, it includes the genera *Brachymeles* Dumeril and Bibron and *Senira* Gray. At first glance the three large pentadactyl species—*B. schadenbergi*, *gracilis*, and *bicolor*—appear to be very different from the diminutive *bonitæ* with stumplike limbs; however, the marked similarity of the upper head scales and the fact that these species form a more or less continuous series warrant placing them in one genus. The recent discovery of two species intermediate between *bicolor* and *bonitæ* makes the relationship of the species appear more obvious.

Taking *Brachymeles schadenbergi* as the most specialized form of the genus, since in this species the leg development seems greatest (that is, the length of the hind leg is contained in the axilla to groin distance 3.25 times,² while in *B. gracilis* the average is 3.6 times),³ it is seen that the relative length of the body (axilla to groin distance) increases and the length and the development of the limbs decrease proportionally in each species of the series. Thus in *B. bicolor* the hind leg is contained in the axilla to groin distance 7 times; in *elerae*, 9.6 times; in *bonitæ* and *burksi*, more than 25 times.

¹ Cat. Liz. Brit. Mus. (1887), 3, 386.

² Average of 20 specimens.

³ Average of 27 specimens.

In the two species first mentioned, which are very closely related, the legs are used more or less; in *bicolor* the legs are for the most part kept folded close to the body and are probably of no great consequence in locomotion; however, the limbs are still pentadactyl. In *eleræ* the limbs are still further reduced and one of the digits on each hand and foot is wanting; in this species the legs are probably of no use in locomotion. In *bonitæ* and *burksi* the legs are reduced to small stumplike rudiments and are scarcely more than 2 millimeters long in the largest specimens.

In this paper I have redescribed the species of the genus from large series of specimens. The characters assigned to *B. gracilis* and to *B. schadenbergi* by Boulenger^{*} are not constant, and specimens of one species can be found that agree with both descriptions. Of the two new species here described, *B. eleræ* is well differentiated by having only four digits; *B. burksi* stands in the same relation to *B. bonitæ* as *B. schadenbergi* does to *B. gracilis*.

Key to the species of Brachymeles.

- a'. Limbs pentadactyl.
- b'. Length of hind leg contained three to four times in the distance between axilla and groin.
- c'. Second pair of chin shields broader than first and separated by one scale *gracilis* Fischer.
- c'. First pair of chin shields broader than second pair, the latter separated by two or three scales *schadenbergi* Fischer.
- b'. Length of hind leg contained about seven times in distance from axilla to groin. First pair of chin shields broadest; second pair separated by two or more scales. Limbs pentadactyl *bicolor* Gray.
- a'. Limbs tetradactyl. Length of hind limb contained nine to ten times in distance from axilla to groin; second pair of chin shields broadest, separated by one scale. *eleræ* sp. nov.
- a'. Limbs stumplike. Limbs contained in axilla to groin distance twenty-five or more times.
- d'. Second pair of chin shields broadest, separated by a single scale.
- d'. First pair of chin shields broadest; second pair separated by three scales *bonitæ* Dumeril and Bibron.

Brachymeles schadenbergi Fischer. Plate I, fig. 1.

Senira bicolor, part., GRAY, Cat. Liz. Brit. Mus. (1845), 98.

Eumeces (Riopa) schadenbergi FISCHER, Jahrb. Wiss. Anst. Hamb. (1885), 11, 87, Pl. III, fig. 2.

Brachymeles schadenbergii BOULENGER, Cat. Liz. Brit. Mus. (1897), 3, 396.

* Boulenger, op. cit., 386.

Description of species.—Rostral large, longer than wide, pointed behind, in contact with the frontonasal in 7 specimens, separated in 18; supranasals present, either in contact or separated; frontonasal usually broader than wide; prefrontals constantly separated, leaving frontal narrowly in contact with frontonasal; frontal large, longer than broad or equal, constantly in contact with two supra-oculars; frontoparietals usually in contact (two specimens show exception), as broad as long or a little broader; interparietal large, longer than broad, with a whitish eyespot; parietals not forming a suture behind interparietal (one exception); no nuchals; nostril pierced in a small nasal, which is followed by a small postnasal; two frenals, first much higher than wide; second lower than first and nearly square; two small preocular scales; five supra-oculars, the second widest; six superciliaries; six or seven upper labials, the fourth entering the orbit (two specimens have the fifth), first largest; four subequal scales at the posterior corner and below the eye; temporal scales slightly enlarged; mental large, somewhat rectangular; five to seven, usually six, lower labials; an undivided postmental wider than deep; first pair of chin shields wider than second pair, in contact or not (10 specimens touch, 10 do not); rostral, mental, first upper and lower labials, nasals, postnasals, and internasals all apparently thickened and lighter in color than body; eye small, its diameter one half its distance from snout; distance from eye to auricular opening greater than from eye to nostril; auricular opening present, small, about halfway between end of snout and insertion of forearm; forearm pressed forward fails to reach auricular opening in large specimens, but does so in some smaller specimens; foreleg followed by a lateral depression into which it is usually folded; distance from tip of snout to insertion of arm from 2 to 2.6 times (average, 2.3) in distance from axilla to groin; length of hind leg contained in this distance from 3 to 4 (average, 3.25). Limbs pentadactyl; with unicarinate lamellæ; six lamellæ under longest finger, eight under longest toe; third and fourth toes practically equal, sometimes the fourth slightly longer, sometimes the third; preanal scales slightly enlarged; 26 to 28 rows of scales about the body (17 specimens, 28 rows; 8 specimens, 26 rows); scales of posterior part of body frequently dimly tricarinate; tail 1.1 times the length of body.

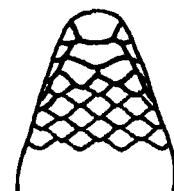


FIG. 1. *Brachymeles schadenbergi* Fischer, c h i : shields. $\times 2$.

Color in life.—Above brown, each scale with a darker brown area, covering eight scale rows; laterally and ventrally brownish yellow with some lateral scales flecked with the darker brown of the dorsal area; scales of belly of some specimens flecked with brown; scales on the ventral part of tail usually dark brown; head and upper labials usually dark brown, scales on the end of snout lighter.

Measurements of Brachymeles schadenbergi Fischer.

	Largest specimen. mm.	Average of 8 nearly equal-sized specimens. mm.
Length	220	206
Snout to vent	112	99
Tail	108	106
Snout to foreleg	31	29
Axilla to groin	71	64
Foreleg	13	12.5
Hind leg	20	19

* Tip missing

Remarks.—This species is common in Mindanao. Most of the specimens examined are from Agusan River Valley. It is a burrowing form and is usually found under logs or trash. The females give birth to from two to five young.

The preceding description is based on a series of 20 specimens from Mindanao.

Brachymeles gracilis Fischer. Plate I, fig. 2.

Senora bicolor, part., GRAY, Cat. Liz. Brit. Mus. (1845), 98; GÜNTHER,
Proc. Zool. Soc. London (1879), 76.

Euneices (Riopa) gracilis FISCHER, Jahrb. Wiss. Anst. Hamb. (1885),
11, 85, Pl. III, fig. 1.

Brachymeles gracilis BOULENGER, Cat. Liz. Brit. Mus. (1887), 3, 387.

Description of species.—Rostral broader than high, visible above; supranasals present, in contact or not behind the rostral (8 specimens touch, 19 do not); frontonasal broader than deep; prefrontals broader than deep, never in contact with each other, laterally forming sutures with both frenals and first superciliary; frontal large, about as long as broad, in contact with the frontonasal and two supra-oculars; frontoparietals constantly in contact, about as broad as deep; parietals elongate, in contact or not behind the interparietal (14 specimens touch, 13 do not); interparietal about as long as broad with a distinct white eye-spot; nostril in a minute nasal followed by a postnasal; two frenals, first highest, second rather square; five or six superciliares; five supra-oculars, second widest; six or seven upper labials,

fourth entering orbit; seven lower labials, mental little wider than deep, followed by an undivided postmental much wider than deep; first pair of chin shields in contact or not (19 specimens touch, 8 do not); second pair of chin shields broadest, separated by a single scale; temporals not or but slightly enlarged; pre-anals somewhat enlarged; foreleg short, with four unicarinate lamellæ under the longest finger; hind leg with third and fourth toes equal, eight lamellæ under each; a short depressed area along the body behind limbs; distance from eye to end of snout about equal to distance from eye to auricular opening; distance from snout to foreleg contained in distance from axilla to groin 2.1 to 2.6 times (average, 2.46); length of hind leg contained in axilla to groin distance 3 to 4.3 times (average, 3.6). The front leg fails to reach the ear by a considerable distance.

Color in life.—The 10 or 12 upper rows of scales dark yellowish brown with darker spots, usually on the posterior part of each scale, forming, sometimes, rather distinct longitudinal lines; below usually dirty yellowish brown, each scale on ventral side of tail with a brownish spot; head blackish brown; sometimes scales on sides and belly have small dark spots. Scales smooth, in 24 to 28 rows.

Measurements of Brachymeles gracilis Fischer.

	mm.
Length	196
Tail	101
Axilla to groin	60
Snout to foreleg	26
Foreleg	9
Hind leg	15

Variation.—The young usually have narrow white stripes from behind the eyes to some distance on the tail, separated by six rows of scales. These frequently persist in half-grown specimens. One specimen from Canlaon Volcano, Negros, shows very marked variation from other specimens from the same locality. It has 30 rows of scales, the legs are better developed; the ear opening much larger and nearer the foreleg than the end of the snout; there is a broad white band on either side, the parietals are in contact; the fourth and fifth supralabials enter the orbit; the distance from snout to foreleg is contained twice in axilla to groin distance; the hind leg in the same distance, 2.7 times. It is probable that this specimen represents a distinct subspecies.

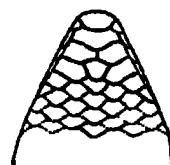


FIG. 2. *Brachymeles gracilis* Fischer. chin shields

Remarks.—Females give birth to from four to six young at a time. Embryos taken from a female captured in Mindoro measured about 60 millimeters and were still surrounded by a large egg mass; the eyespot on the interparietal is prominent in the embryos.

This species is common in Negros and is especially common in Mindoro. I was unable to find it in Mindanao where it has been reported by J. G. Fischer.^{*} I surmise that the specimen reported by Fischer is *B. schadenbergi*. The preceding description is based on a series of 27 specimens from Negros and Mindoro.

Brachymeles bicolor Gray. Plate I, fig. 3.

Senira bicolor, part., GRAY, Cat. Liz. Brit. Mus. (1845), 98.

Brachymeles bicolor BOULENGER, Cat. Liz. Brit. Mus. (1887), 3, 388,

Plate XXXI. CASTO DE ELERA, Fauna de Filipinas (1895), 422.

Description of species.—Rostral very much broader than deep, not touching the frontoparietal; internasals large, broadly in contact behind the rostral and forming their longest suture with the frontonasal; latter much broader than deep, in contact with one loreal and in-contact with the frontal at a single point; pre-frontals large, minutely separated, wider than deep; frontal longer than wide, rather pointed in front, touching two supraoculars; two frontoparietals, a little wider than deep, broadly in contact behind frontal; two very elongate parietals, lying diagonally, nearly three times as long as wide, forming a suture behind interparietal; latter longer than broad; a pair of nuchals, narrow and elongate; a large, elongate temporal borders parietal; nasal extremely small, only a ring about nostril; a postnasal of nearly the same size; two large frenals, first higher than wide, higher than second; second frenal nearly square; a preocular directly in front of eye; five supra-oculars, second longest and arranged as in other members of the genus, two in contact with frontal; a few small scales below orbit above labials; six superciliaries; six upper labials, first largest, not touching internasal; fourth under eye, first four of nearly the same size; two or three scales in temporal region enlarged; six lower labials; mental broader than deep, rather rectangular; postmental single, wider than deep; first pair of chin shields in contact, wider than second pair; the latter small, separated by three scales (like the arrangement in *B. schadenbergi*). Ear opening greatly reduced and well poste-

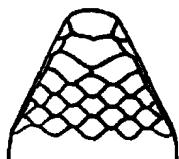


fig. 3 *Brachymeles bicolor* Gray. chl shields X 2.

rior to eye; 28 rows of scales around the body; anals not or scarcely enlarged. Legs small, five fingers and toes present, all clawed; lamellae below digits feebly compressed and unicarinate, limbs rather broadened at base. Hind leg contained in the distance from axilla to groin 7.4 times.

Color in alcohol.—Above dark red-brown, covering ten scale rows; each scale with a darker brown spot, which is not readily discerned; head and upper parts of limbs brown; laterally and ventrally the color is yellowish to brownish white, distinctly contrasted with the color above.

Measurements of Brachymeles bicolor Gray.

	mm.
Length, tail broken and a partial regeneration begun	215
Snout to vent	155
Width of body	18
Width of head	14
Snout to ear	15
Snout to eye	6
Snout to foreleg	32
Axilla to groin	112
Foreleg	8
Hind leg	15

Remarks.—The specimen contained two embryos which were almost fully matured. They measure 90 and 86 millimeters, respectively; width of head, 6.5; snout to vent, 48; hind limb, 6. The head scales are identical with those of the mother, save that the interparietals are a little wider than deep; the nuchals are present in one specimen, in the other they are broken. I regard the presence of the nuchals as a normal characteristic, although the figure of the type does not show them. This species is apparently very rare. I have been unable to find it, and there is no specimen in the Bureau of Science collection. I am inclined to believe that it is an inhabitant of north-central and western Luzon, although I have been unable to find any definite localities recorded. It is the largest known species of the genus and is readily recognized by the elongate body.

Described from a specimen in the Santo Tomas Museum, Manila. It has no number. It is labeled "Filipinas."

Brachymeles elerae sp. nov. Plate I, fig. 4.

Type.—Museum of Santo Tomas, unnumbered; the collector unknown; labeled "Filipinas."

Description of type.—Rostral but little wider than deep, bending backward somewhat over end of the snout, broadly in contact with frontonasal; internasals reduced, separated, in contact with

first labials; frontonasal nearly as long as broad, narrowly in contact with frontal; the latter longer than broad, produced to



FIG. 4. *Brachymeles elerae* sp. nov., type, chin shields.
X 2.

a point in front, in contact with two supra-oculars; frontoparietals quadrangular, moderate, separate; frontal touches interparietal, which is diamond-shaped; parietals elongate, three times as long as wide; nasal minute, a mere rim around nostril; two frenals, first higher than wide; second almost square; one large preocular; five supra-oculars, the second widest; six superciliaries; six labials above, first labial largest, the fourth entering orbit; one pair of nuchals; temporals somewhat enlarged, the largest bordering parietal; mental quadrangular, wider than deep; one postmental, wider than deep; first and second pairs of chin shields divided by a single, median, much-enlarged scale, second pair somewhat broader than first pair; third pair of chin shields divided by three scales. Limbs much reduced, each with four diminutive, clawed digits; ear opening wanting; two anals distinctly enlarged; eye rather small; 24 scale rows around anterior part of body; 22 about middle; length of hind leg in distance from axilla to groin about ten times.

Color in alcohol.—Very light yellowish brown above and on sides, each scale with a dark brown spot, which forms longitudinal dotted lines on each scale row; dots below smaller and not so distinct as above.



FIG. 5. *Brachymeles elerae* sp. nov., cotype, chin shields.
X 2.

Color in alcohol.—Very light yellowish brown above and on sides, each scale with a dark brown spot, which forms longitudinal dotted lines on each scale row; dots below smaller and not so distinct as above.

Measurements of *Brachymeles elerae* sp. nov.

	Type. mm.	Cotype. mm.
Length	128	108
Snout to vent	68	63
Width of body	6	6
Width of head	5.1	5
Axilla to groin	51	44
Snout to foreleg	15	12
Foreleg	3.5	3.1
Hind leg	5.2	4.6
Scale rows	22-24	24-26

Variation.—A second specimen in Santo Tomas Museum is in the same container and is probably from the same locality. Its measurements are included in the preceding table.

The two specimens agree very well, save that in the cotype the scale dividing the first pair of chin shields is smaller and the

second pair is divided by only a single scale. This is probably the normal condition.

Remarks.—While no locality is given, I am assured by the Director of Santo Tomas Museum that the specimens are from Nueva Vizcaya. I take pleasure in naming the species for Father Casto de Elera in recognition of his contribution to Philippine zoölogy.

Superficially this species resembles *Lygosoma lineatum* Gray and thus the specimens were found labeled. In common with this species they have four digits on the limbs, and the coloring and the marking are strikingly similar, but here the resemblance ceases. It has no close affinities in the genus.

Brachymeles burksi sp. nov. Plate I, fig. 5.

Type.—No. 700, male, private collection; collected at Sumagui (Liddell Plantation), east coast of Mindoro; May 4, 1916; by E. H. Taylor.

Description of type.—General appearance rather wormlike; head bluntly pointed. Rostral large, visible above for nearly half its length, rather broadly in contact with the frontonasal; nostril in a minute nasal between first labial, supranasal, and rostral; supranasal in contact with largest frenal and first labial; these scales on point of snout thickened; frontonasal a little broader than long, narrowly in contact with frontal, which is slightly longer than broad and in contact with first and second supra-oculars; prefrontals rather rectangular, touching two frenals, first superciliary, and first supra-ocular; four supra-oculars, second widest, last smallest; four or five superciliaries; frontoparietals somewhat rectangular, little larger than prefrontals, touching two supra-oculars; interparietal a little longer than broad, narrowly in contact with the frontal; parietals more than twice as long as wide, in contact behind interparietal, touching two supra-oculars, two temporals, and an elongate nuchal; two frenals, a small preocular before eye; no postnasal; six upper labials, fourth entering orbit; six lower labials; mental moderate, thickened, wider than high; an unpaired postmental, followed by three pairs of chin shields none of which are in contact, second pair widest; two temporals between parietal and sixth labial; 24 scale rows; two distinctly enlarged preanals; eyes small; ear completely hidden; legs reduced to scaled stumplike rudiments with no indication of digits; length from snout to foreleg 4.5 times in distance between axilla and groin.



FIG. 5. *Brachymeles burksi* sp. nov., chin shield $\times 2$.

Measurements of *Brachymeles burksi* sp. nov.

	mm.
Length, tail regenerated	108
Snout to anus	73.5
Axilla to groin	60
Snout to foreleg	18.5
Width of head	4.5
Width of body	5.4
Foreleg	1.1
Hind leg	1.3

Color in life.—Above and below dark (sometimes purplish) brown, each scale having a darker area with the edges somewhat lighter; end of snout grayish.

Remarks.—Several specimens of this species were taken on the eastern coast of Mindoro at Sumagui, on the Liddell Plantation; ten specimens were taken later at Calapan, on the northern coast. They were found burrowing under logs and in rotting wood. Very little variation is evident; most of the specimens have 22 instead of 24 scale rows; one specimen has only five upper labials, the third entering the orbit. The females give birth to two young. Embryos taken from one female measured 56 and 54 millimeters; they seem almost entirely developed.

This species is closely related to *Brachymeles bonita*, but differs from it in the following characters: The leg stumps are even more reduced, the prefrontals and frontoparietals are smaller, nuchals are present, the mental is much smaller, and the postmental is in contact with two instead of one labial, the second pair of divided chin shields are broader than the first pair and are separated by a single scale.

I take pleasure in naming this species for Mr. Clark Burks, who assisted in making collections in western Mindoro.

Brachymeles bonita Dumeril and Bibron. Plate I, fig. 6.

Brachymeles bonita DUMERIL and BIBRON, Erp. Gén. (1839), 5, 777; GRAY, Cat. Liz. Brit. Mus. (1845), 98; BOETTGER, Bericht. ü. d. Senck. Nat. Gesel. (1886), 103; BOULENGER, Cat. Liz. Brit. Mus. (1887), 3, 388.

Description.—Rostral large, triangular, about as high as wide; internasals present, large, separated; frontonasal large, a little wider than long, in contact laterally with a single frenal, forming sutures with rostral and frontal; prefrontals separated, in contact laterally with two frenals and first superciliary; frontal about as broad as long, in contact with two supra-oculars and narrowly with interparietal; frontoparietals rather large, separated;

parietals about three times as long as wide, forming a suture behind interparietal; nostril pierced in a minute nasal; no postnasal; first labial in contact with internasal, two enlarged frenals; five supraciliaries, four supra-oculars, second widest; six supralabials, third and fourth entering orbit; temporals enlarged, nuchals slightly enlarged; mental large, followed by an enlarged postmental, which is in contact with a single lower labial; four pairs of divided chin shields, first largest and widest; fourth pair very small; ear hidden; limbs reduced to stumps with no digits; 26 rows of scales about body; eye small; scales on point of snout thickened; length of legs twenty-eight times in axilla to groin distance.

Color in life.—Uniform purplish brown, lighter on throat and chin. Scales on snout lighter than other head scales.

Measurements of Brachymeles bonita Dumeril and Bibron.

	mm.
Length, tail regenerated	113
Length of head	9
Width of head	5.5
Axilla to groin	65
Foreleg	2.3
Hind leg	2.3
Snout to foreleg	13.5

Remarks.—This species stands much in the same relation to *B. burksi* as *B. schadenbergi* does to *B. gracilis*. The following differences are present: The mental is larger, the arrangement of the chin shields is essentially different, and the postmental is in contact with a single labial instead of with two as in *B. burksi*. Several other minor differences are evident on a comparison of the two species.

Described from No. 1151, private collection; Los Baños, Laguna, Luzon, on the side of Mount Maquiling, elevation about 100 meters; April 10, 1917; E. H. Taylor, collector.

NOTE: Since this paper has gone to press, two apparently new species of the genus *Brachymeles* have been discovered in the Sulu Archipelago. One is a pentadactyl form, the other has lost all external vestiges of limbs. They will be described in a forthcoming paper on Sulu reptiles.



FIG. 7. *Brachymeles bonita* Dumeril and Bibron, chin shields. $\times 2$.

ILLUSTRATIONS

[Photographs by Bureau of Science.]

PLATE I

- FIG. 1. *Brachymeles schadenbergi* Fischer.
2. *Brachymeles gracilis* Fischer.
3. *Brachymeles bicolor* Gray.
4. *Brachymeles elerm* sp. nov.
5. *Brachymeles burksi* sp. nov.
6. *Brachymeles bonita* Dumeril and Bibron.

TEXT FIGURES

[Drawings by P. Moukaira]

- FIG. 1. *Brachymeles schadenbergi* Fischer, chin shields. $\times 2$.
2. *Brachymeles gracilis* Fischer, chin shields. $\times 2$.
3. *Brachymeles bicolor* Gray, chin shields. $\times 2$.
4. *Brachymeles elerm* sp. nov., type, chin shields. $\times 2$.
5. *Brachymeles elerm* sp. nov., cotype, chin shields. $\times 2$.
6. *Brachymeles burksi* sp. nov., chin shields. $\times 2$.
7. *Brachymeles bonita* Dumeril and Bibron, chin shields. $\times 2$.

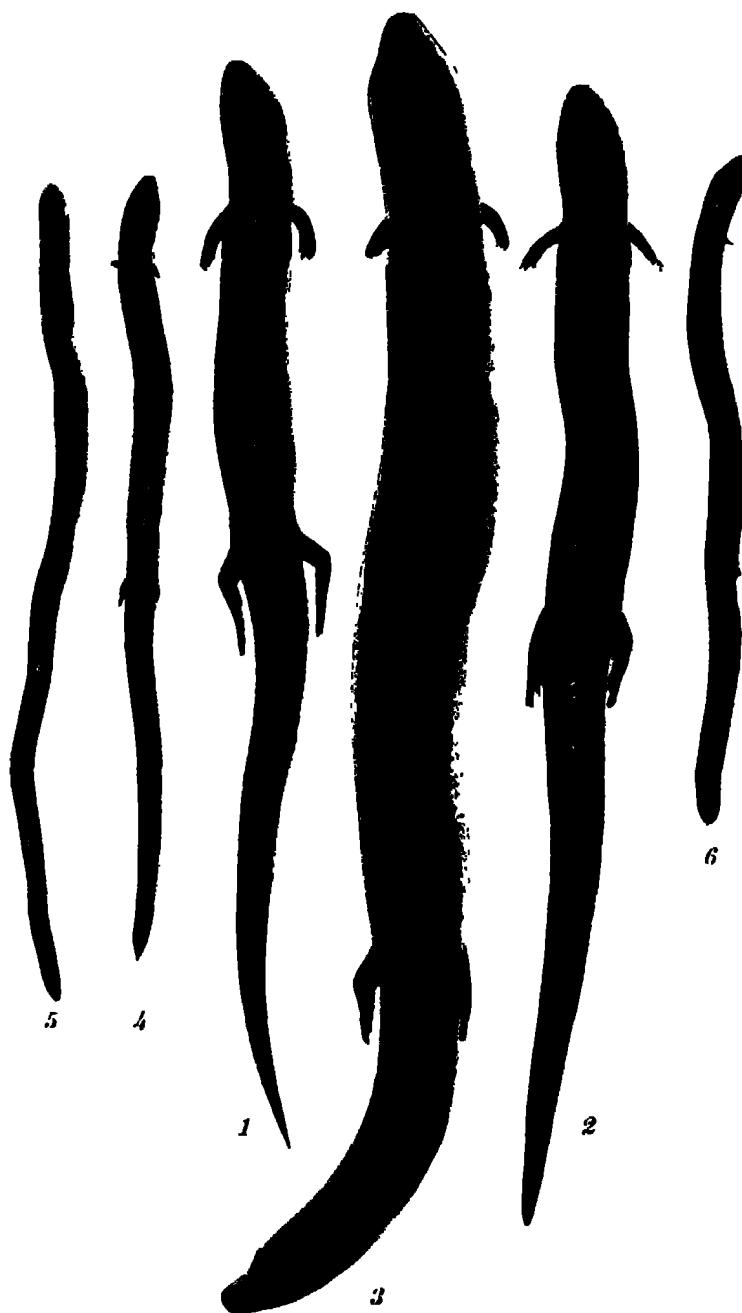


PLATE I. SIX SPECIES OF THE GENUS BRACHYMELES

ICHNEUMONOID PARASITES OF THE PHILIPPINES, I

RHOGADINAE (BRACONIDÆ), I

By C. F. BAKE

(*Los Baños, P. I.*)

In laying the foundations for work in economic entomology in the Philippine Islands, a comprehensive study of the hymenopterous parasites occurring in the Archipelago is of the highest importance. A bare beginning in this work has been made. Of the marvelously rich fauna in these groups but very few and scattering species have been made known to science; many of these are to be credited to the activities of two Jesuit priests, Fathers Brown and Stanton, whose field work was practically confined to the garden of the Manila Observatory. A few were obtained by Semper, the German lepidopterologist, and by other travelers.

Only two species of the subfamily Rhogadinae have been described from the Philippines, but this subfamily is represented here by many interesting and some peculiar genera and by a very considerable number of species. It is entirely probable that the twenty-one species of thirteen genera described herein¹ are but a small fraction of those existing in the Islands, since they have been obtained at a few widely separated localities and as a result of merely desultory collecting. The Rhogadinae are parasitic on various Coleoptera and Lepidoptera, and many of the species are of economic importance.

This subfamily may be defined as cyclostomatous braconids with margined occiput and sessile or subsessile or even subpetiolate abdomen, having wings with three cubital cells, head transverse and narrowed behind the eyes, usually one or more abdominal tergites with median carina, and the abdominal dorsum usually coarsely striate in large part. The degree of connation in the second abdominal suture is variable. The body is usually covered with rather long, sparse, white pubescence, this becoming shorter and thicker on the legs. The hind tibial spurs are of various types and furnish good classificatory char-

¹ Numerous species of the genus *Rhoges* will be described in a later paper.

acters. The pronotum is extended in widely variable degrees; its anterior outline is very various and is difficult to describe. The mesonotum varies from deeply trilobed to evenly convex, and the notauli from deeply impressed to subobsolete. The scutellar foveæ and the sculpturation of the metanotum and the abdominal tergites are good sources of diagnostic characters. In all Philippine species the lower angle of the metapleura is produced in a broad tooth above the hind coxal cavity, and the form of this tooth presents considerable variety. The eye is always emarginate within in the large-eyed forms, although the depth of emargination is variable. The nervellus in the hind wings is almost always oblique, although it varies from straight to curved or even to angularly bent at the middle; it is rarely vertical as in *Neorhyssalus*.

The following genera and species are described in this paper:

<i>Rhyssalus unicolor</i> Ashmead.	<i>Megarhogas esepigeti</i> sp. nov.
<i>Rhyssalus ashmeadii</i> sp. nov.	<i>Trigonophatnus nigricornis</i> sp. nov.
<i>Neorhyssalus compositus</i> g. et sp. nov.	<i>Trigonophatnus philippinensis</i> sp. nov.
<i>Heterogamus longicollis</i> sp. nov.	<i>Rhogacella straminea</i> g. et sp. nov.
<i>Colastomion abdominalis</i> g. et sp. nov.	<i>Rhogacella lineata</i> sp. nov.
<i>Macrostomion debilis</i> sp. nov.	<i>Pseudogyroneuron mindanaensis</i> g. et sp. nov.
<i>Macrostomionella philippinensis</i> g. et sp. nov.	<i>Paragyroneuron bicolor</i> g. et sp. nov.
<i>Macrostomionella similis</i> sp. nov.	<i>Gyroneuronella kokujewii</i> g. et sp. nov.
<i>Megarhogas stigmaticus</i> sp. nov.	<i>Hemigyroneuron speciosus</i> g. et sp. nov.
<i>Megarhogas philippinensis</i> sp. nov.	<i>Hemigyroneuron suffusus</i> sp. nov.
<i>Megarhogas mindanaensis</i> sp. nov.	

BRACONIDÆ

RHOGADINÆ

Synopsis of the Philippine genera.

- a'. Metanotum laterally, partly or entirely, areolated; ovipositor long.
- b' Recurrent vein entering second cubital cell; metanotum with antero-lateral areas only; radius in hind wings obsolete.
 - Rhyssalus* Haliday.
 - b' Recurrent vein entering first cubital cell; metanotum fully areolated.
 - Neorhyssalus* g. nov.
- c'. Metanotum laterally not areolated; ovipositor short; recurrent vein entering first cubital cell or interstitial.
- c'. First abscissa of radius longer than second; second cubital cell quadrate; terminal abdominal segments retracted; radius in hind wing obsolete; hind tibial spurs straight, very short, pubescent.
 - Heterogamus* Weemael.

- e'. First abscissa of radius shorter than second.
- d'. Hind tibial spurs distinctly curved, naked entirely or in part; maxillary palpi with one or several joints modified or dilated.
- e'. Metanotum without lateral prominences posterior to spiracles; spiracles circular or oval.
- f'. Maxillary palpi with third joint enlarged, but not flattened; second cubital cell twice as long as high and not narrowed apically; metanotal spiracles raised on umbos; mesopleura with discal furrows..... *Colastomion* g. nov.
- f'. Maxillary palpi with several joints flattened and sometimes twisted; second cubital cell three times as long as high and distinctly narrowed apically; metanotal spiracles not raised; mesopleura without discal furrows... *Macrostomion Szepligeti*.
- e'. Metanotum with blunt lateral prominences posterior to the spiracles; spiracle elliptical; second cubital cell nearly or quite three times as long as high and distinctly narrowed apically; vertex back of ocelli very short..... *Macrostomionella* g. nov.
- d'. Hind tibial spurs straight or nearly so, pubescent; maxillary palpi normal, slender, rarely with certain joints inflated, as in *Pseudogyroneuron*.
- g'. Transverse median and postmedian veins normal, straight.
- h'. Metanotum without distinct lateral prominences.
- f'. Abdomen distinctly subpetiolate, the first segment long and strongly narrowed toward base; second abscissa of radius three or four times length of first; ocelli and eyes very large; malar area and cheeks relatively small; abdomen conspicuously longer than head and thorax together.
- j'. Metathoracic spiracles elliptical; mesopleura with strong discal furrows; second abscissa of radius swollen at base (in Philippine species); size large. *Megarhogas Szepligeti*.
- j'. Metathoracic spiracles round or oval; mesopleura without discal furrows or with rudiments only; size medium. *Trigonophataus Cameron*.
- f'. Abdomen broadly sessile, the first segment very slightly narrowed toward base and very broad for the length; second abscissa of radius less than three times length of first; ocelli and eyes varying from large to small; abdomen not or but little longer than head and thorax together.
- k'. Submedian cell as long as median on the median vein, transverse median vein interstitial with basal; ocelli very small; radial vein of hind wings on basal third, suddenly, strongly curved toward costa. *Rhogasella* g. nov.
- k'. Submedian cell always longer than median on the median vein, usually much longer; ocelli large to small; radial vein of hind wings not suddenly curved toward costa, although radial cell broadened apically in some species. *Rhogas* Nees.
- h': Metanotum laterally with strong prominences; mesonotum deeply trilobed; radius in hind wing curved toward costa.

f. Maxillary palpi with certain joints greatly dilated and modified; metanotal prominences not toothed; nervellus in hind wings oblique, slightly curved.

Pseudogyreoneuron g. nov.

f'. Maxillary palpi normal, all joints slender, metanotal prominences extended in strong teeth; nervellus in hind wings bent at middle..... *Paragyreneuron* g. nov.

g'. Transverse median and part of postmedian veins, one or both, strongly curved; mesonotum not trilobed.

m'. Stigma very short and wide, twice as long as wide; postmedian vein not strongly swollen, but very strongly curved; mesonotum laterally with strong toothed prominences.

*Gyreneuron Kokujew.**

m'. Stigma long and narrow, three or more times as long as wide, transverse median vein greatly swollen, although in some species not curved; mesonotum without lateral prominences.

n'. Notauli distinct on disk of mesonotum; scutellum anteriorly bifoeteate; postscutellum small and minutely bifoeteate; abdomen distinctly longer than head and thorax together, terminal segments not retracted; ocelli of medium size and distant from eyes, vertex posterior of ocelli long; head and mesonotum nearly smooth; radius in hind wings obsolete.

Gyreneuronella g. nov.

n'. Notauli obsolete on disk of mesonotum; scutellum anteriorly sexfoeteate; postscutellum large and sexfoeteate; abdomen not or scarcely longer than head and thorax together, terminal segments more or less retracted; ocelli of great size, approximating the eyes, vertex posterior of ocelli very short; head and mesonotum coarsely sculptured; radius in hind wings distinct. *Hemigyreoneuron* g. nov.

* This Indian genus is inserted for comparison.

Genus *RHYSSALUS* Haliday

Synopsis of the species.

a'. Ovipositor shorter than hind tarsi; abdomen with three visible segments; antennae yellowish white at base (five or six joints) and concolorous with legs; stigma pale, clouded at apex; head and thorax smooth *unicolor* Ashmead.

a'. Ovipositor three times length of hind tarsi; abdomen with six visible segments; antennae unicolorous with the dark ferruginous body, the legs paler; stigma pale throughout; head and thorax heavily sculptured *ashmeadii* sp. nov.

Rhyssalus unicolor Ashmead.

Rhyssalus unicolor ASHMEAD, Proc. U. S. Nat. Mus. (1905), 28, 970.

"Female.—Length 1.5 mm.; ovipositor shorter than the hind tarsi. Brownish yellow, the sutures of the three-segmented abdomen blackish; stemmaticum black; eyes purplish brown; antennae toward base (the first five or six joints), the palpi, and the legs white or yellowish white. Wings hyaline, the stigma, except at apex, and the internal veins, except as here-

after noted, yellowish white; the apex of the stigma, the radius, and the costal veins brownish. Head and thorax smooth, the metanotum with a forked carina. The abdomen is longitudinally striated, the segments subopaque.

Type.—Cat. 8320, U. S. N. M.
Manila. (Robert Brown.) One specimen."

I have not collected this species; the structure of the type specimen should be described.

Rhyssalus ashmeadii sp. nov.

Dark ferruginous, antennæ concolorous, legs and tegulae paler, maxillary palpi white; ovipositor guides piceous at the clavate extremities, ovipositor ochraceous; extreme base of hind tibiae the color of body. Wings slightly, but evenly, obscured with smoky, veins and stigma darker.

Female, length, 3 millimeters; ovipositor, 1.

Head viewed from above with eye margins even with its general outline, not at all bulging; vertex caudad of eyes heavily, transversely striate, rapidly narrowed posteriorly, length of exposed cheek margin about equal to distance between lateral ocelli and eyes; ocelli small, nearly as far from each other as from eyes; ocellar area, as far as to eyes and to face, irregularly rugose. Face broader than long and broader below than above, medially, slightly carinately ridged just below antennæ, the surface finely and evenly rugose; mouth opening very large and very broad; eyes only slightly emarginate opposite antennæ. Head as viewed from side with upper part of face strongly bulging, malar space very large, longer than length of mandible; cheeks broad below, narrowed above to half the width below; eye outline large and subcircular; maxillary palpi reaching tegulae.

Mesonotum with lateral areas shallowly rugose, median area nearly smooth; notauli fine, indistinct, not impressed, rapidly converging to posterior border, where they are separated by a short, smooth, median sulcus. Scutellum anteriorly with two transverse foveæ, backwardly curved at lateral ends and separated by a sharp median carina; disk of scutellum smooth. Metanotum with a sharp median carina on basal third which splits apically, the forks extending laterally in a broad curve and then cephalad to base of metanotum, where they are parallel to the median carina, the areas thus inclosed being longer than broad and smooth and shining; the remainder of metanotum is scarcely reticulate-rugose. Mesopleura coarsely, in part obliquely, striate.

Abdomen sub sessile, subclavate in general form, the segments

rapidly increasing in size caudad; second segment little more than half the length of first, third and fourth subequal; fifth and sixth subequal; second and fifth tergites broadly depressed on basal third; all tergites very coarsely striate, the striae smooth and straight, and on most segments ending submarginally; sixth tergite with the striae continuously concentric beyond a central point and parallel to the broadly rounded hind margin. Hind tibial spurs very short, scarcely extending beyond tip of tibia.

Stigma of medium size, four times as long as wide, lower margin subangulate at middle where radius is inserted; first abscissa of radius slightly more than half the length of second; second cubital cell subtrapezoidal, about twice as long as high; both transverse cubitals oblique; recurrent nervure inserted at extreme apex of second cubital cell; parallel vein inserted above. In the hind wings, the second recurrent joins anterior vein at origin of radius, which is entirely transparent.

Luzon, Tayabas, Malinao (coll. Baker).

This species is named for the late W. H. Ashmead, formerly custodian of Hymenoptera in the United States National Museum.

Genus *MEORHYSSALUS* novum

Eyes very large, malar space and cheeks relatively small. Vertex posterior of ocelli long. Antennæ longer than entire body, scape short and swollen, funicle broad and half as long as scape; flagellar joints more than twice as long as wide. Maxillary palpi very slender, long, surpassing tegulae, third to sixth joints subequal, terete.

Scutellum sexfoveate anteriorly. Metanotum entirely without lateral prominences, but fully areolated, middle areae reticulate-carinate; spiracles small, round. Disk of mesopleura with a broad, crenulated, oblique furrow.

Radial cell reaching apex of wing. Radius inserted at middle of the large, deep, subtriangular stigma. First abscissa of radius little more than half length of second; second cubital cell short and somewhat narrowed apically. Recurrent nervure inserted far from apex of first cubital cell. Submedian cell a little longer than median. Parallel vein inserted at lower fourth.

Abdomen subsessile, as long as head and thorax together; three large, long, flat abdominal tergites exposed, the remainder retracted and bent beneath; only the first tergite is distinctly medially carinate. Hind tibial spurs short, straight, and pubes-

cent. Ovipositor long exserted, as long as abdomen, the hypopygium small.

Type, *Neorhyssalus compositus* sp. nov.

Neorhyssalus compositus sp. nov.

Black; head except interocellar area, and mesonotum except lateral lobes, ferruginous; scape and funicle piceous; palpi, tegulae, venter, and coxae stramineous; remainder of legs testaceous, tibiae and femora paler at base. Wings iridescent, faintly obscured; veins, and stigma except at base, brownish.

Female, length of body, 3.5 millimeters; of ovipositor, 1.5.

Head viewed from above with eye margins even with the general outline, not at all bulging; vertex caudad of eyes smooth and shining, rapidly narrowed posteriorly; length of exposed cheek margin subequal to length of vertex back of ocelli and a little greater than width between lateral ocelli and eyes; ocelli small, somewhat nearer to each other than to eyes; interocellar distance slightly greater than the diameter of an ocellus; depression between anterior ocellus and scrobes abrupt, deep, and nearly smooth. Face subquadrate, medially subumbonate below antennae and strongly depressed in the lower lateral areas next to clypeus, surface nearly smooth, except for a few subobsolete punctures; mouth opening broad, transversely elliptical; clypeus somewhat swollen, strongly convex. Head as viewed from side with face not strongly bulging, malar space very short; cheeks rather narrow, the margin parallel with eye margin; eye outline irregularly subelliptical, broadest at lower third, below which it is rapidly narrowed. Third joint of maxillary palpus slightly bent.

Pronotum strongly sculptured and with a thin, shortly extended, anterior margin. Mesonotum evenly convex, notauli strong but superficial, and the lateral lobes not raised; notauli crenulate, converging very gradually and posteriorly flanking the large flattened median area, the latter coarsely and very irregularly rugose. Scutellum anteriorly sexfoveate, four median foveæ long and narrow, two outer larger and rounded, all separated by low, sharp carinæ; posterior disk of scutellum strongly convex, smooth, and shining; postscutellum medially bifoveate. Metanotum fully areolated, the two large median basal area and four large lateral apical areae smooth within, median area and midlateral area strongly reticulate-carinate; spiracles small and round; metapleura reticulate-rugose; upper anterior area of mesopleura finely rugose, remainder of surface

smooth and shining, except for a large, deep, oblique, crenulated discal furrow, surface on either side of this furrow somewhat swollen.

Abdomen subsessile, the three segments visible from above broadened from base to third segment; basal width of first tergite two thirds the apical width and the length about twice; second tergite as long as first, its length one and a half times the basal width, the latter three fourths of the apical; third tergite subquadrate, basal margin strongly incurved, apical margin truncate; remaining segments small, short, smooth, and shining, and in the type specimen bent downward at right angles to remainder of abdomen; first two tergites shining, strongly, longitudinally straight-striate, more strongly so on first; first with a strong median carina; basal two thirds of third tergite with the striae directed obliquely toward lateral margins, posterior third with strong, curved, transverse striae. Hind tibial spurs short, straight, and pubescent.

Stigma large, deep, strongly angled below at middle where radius is inserted; first abscissa of radius more than half length of second; second cubital cell somewhat narrowed distad, the length twice the greatest width, first transverse cubital oblique, second vertical and decolored; recurrent nervure inserted a half of its length from apex of first cubital cell, intervening vein decolored. Radius in hind wings entirely obsolete; nervellus vertical.

Luzon, Laguna, Mount Maquiling (coll. Baker).

Genus *HETEROGAMUS* Wesmael

While very few species have been described in this genus, they have a wide distribution, being found in Europe, North America, Central America, and New Guinea. It is rather to be expected, therefore, that several species will be found in the Philippines. The description of one Philippine species follows:

Heterogamus longicollis sp. nov.

Fulvo-ochraceous throughout, slightly darker on abdominal tergites; interocellar area black. Wings slightly obscured, stigma and veins piceous, veins on distal half of wing, with proximal two thirds of stigma, paler. Palpi stramineous. Ovipositor black.

Female, length, 5 millimeters; ovipositor very short and subapical.

Head viewed from above with vertex back of ocelli very long, roundly narrowed back of eyes, entire surface finely and shallow-

ly reticulate-rugose; eyes rather small; ocelli small, slightly farther from eyes than from each other and about three times as far from occipital carina as from each other; supra-antennal area strongly, transversely rugose. Face subquadrate, as broad as long, surface minutely roughened, medially short-carinate just below the antennæ; mouth opening very narrow, upper margin strongly arched; eye margins very slightly emarginate opposite antennæ. Head viewed from the side with face very strongly projecting to form a very prominent angle at lower margin of scrobes; malar space very large, as long as width of eye; cheek broad below, strongly narrowed above; ocelli not at all raised; eye outline very short and broadly elliptical; maxillary palpi reaching tegulae, very slender, third joint the longest.

Pronotum coarsely rugose and greatly lengthened, as long as head to anterior ocellus. Mesonotum opaque, finely, shallowly reticulate-rugose; notauli barely indicated, straight, converging to posterior margin. Scutellum sculptured like mesonotum, anteriorly with six small foveæ separated by sharp carinæ and well separated from mesonotum; posterior disk of scutellum small and pear-shaped. Metanotum coarsely, closely, and irregularly reticulate-rugose (as are the pleura), and with a continuous median carina; a straight lateral carina passes just below the circular spiracle to near the hind margin, where it turns at a right angle and extends irregularly to median carina. Mesopleura coarsely rugose anteriorly, with a short, very coarsely crenulated, oblique furrow. Mesosternum anteriorly with a strong, transverse, submarginal carina, which extends a short distance on to mesopleura.

Abdomen about as long as head and thorax together, with three large exposed segments; the remainder retracted, of which only the fourth is narrowly visible from above; first segment sessile, twice as broad apically as basally, length one and a half times the width at apex; second tergite a little longer than first and slightly widened apically and like the first with a continuous median carina; third tergite about as long as first, subquadrate and carinate; all tergites finely, irregularly, reticulate-rugose, the reticulations becoming much finer toward apex of third tergite; retracted segments smooth, shining, and stramineous; second suture slightly impressed and finely crenulate. Hind coxae slender, shorter than their trochanters, finely transversely striate. Hind tibiae with spurs short and nearly straight.

Stigma large and broad, length about three times the breadth, angled below at origin of radius, which is a little nearer to apex

than to base; first abscissa of radius longer than second, second cubital cell very short, both transverse cubitales oblique, second decolored; recurrent nervure joining cubitus far from second cubital cell, intervening vein nearly as long as first abscissa of radius and decolored; parallel vein inserted far below the middle. Hind wings similar to those of *Macrostromionella*.

Luzon Laguna, Los Baños (coll. Baker).

Genus COLASTOMION novum

Eyes of medium size, malar space and cheeks relatively large. Anterior ocellus distinctly farther from the two posterior than the distance between the latter. A narrow area about ocelli, except posteriorly, depressed and striate. Vertex back of ocelli of medium length. Antennæ not as long as entire body; scape one and a half times as long as wide; funicle nearly as long as wide and a little less than half the width of scape; flagellar joints slightly more than twice as long as wide. Maxillary palpi slender, barely reaching tegulae; third joint as long as fourth and fifth together, somewhat flattened and expanded apically in side view; last three joints slender and terete, sixth longer than fifth, fifth more than half length of fourth. Labial palpi unusually small and short.

Mesonotum scarcely trilobate, notaui shallow, a little impressed anteriorly, posteriorly strongly converging and practically obliterating the posterior median area. Scutellum bifoveate anteriorly. Metanotum medially carinate on basal third, on apical two thirds with a large lozenge-shaped median area; lateral areas very coarsely and strongly reticulate-rugose; spiracle large, round, and raised on a well-defined umbo. Mesopleura with an oblique crenulated discal furrow on posterior half.

Radial cell reaching apex of wing. Radius inserted at basal two fifths of the large, deep, subtriangular stigma. First abscissa of radius less than half length of second; second cubital cell about twice as long as wide, first transverse cubital very oblique, the second vertical, curved, and decolored. Recurrent vein inserted a short distance from apex of first cubital cell. Submedian cell but slightly longer than median. Parallel vein strongly curved and inserted at lower third.

Abdomen subpetiolate, longer than head and thorax together, beyond first segment rather broadly elliptical in outline, tergites all much wider than long, the surfaces of third, fourth, fifth, and sixth somewhat swollen before their hind margins; first and second tergites medially carinate. Second, third, and fourth sutures crenulate, broadly and sharply impressed and somewhat

constricted. Hind tibial spurs as long as fourth tarsal joint, rather strongly curved and naked. Ovipositor very short; hypopygium very large, deeper than sixth segment, and as long as fifth and sixth tergites together.

Type, *Colastomion abdominalis* sp. nov.

The abdomen in this genus resembles that of *Colastes* Haliday, but other features are distinctive.

Colastomion abdominalis sp. nov.

Head fulvous; interocellar area black; antennæ piceous; palpi ochraceous; thorax ferruginous, postscutellum darkened, tegulae ochraceous; metanotum black; legs ochraceous, hind coxae black, except at tips; abdomen ochraceous below, tergites except lateral margins, and ovipositor, apically black; hypopygium discally piceous. Wings slightly obscured, stigma and veins piceous.

Female, length, 6 millimeters; ovipositor very short, not exceeding abdomen by 0.25 millimeter.

Head viewed from above with vertex back of eyes roundly swollen beyond continuation of eye margin; vertex smooth, except near ocelli; ocellar area, except posteriorly, surrounded by radiating ridges, which do not reach the eyes; vertex not rapidly narrowed caudad, length of exposed cheek margin greater than distance between posterior ocelli and eyes; ocelli farther from eyes than from each other and twice as far from occipital carina as from each other. Face subquadrate, broader than long, inner margins of eyes parallel; surface shining, minutely rugulose, medially carinately elevated just below antennæ; mouth opening narrow, its upper margin nearly horizontal; eyes within very slightly emarginate at antennæ. Head viewed from side with face strongly and roundly bulging, malar space narrower than cheek; cheek broad, slightly narrowed above; vertex outline strongly raised just back of ocelli; eye outline ovate; maxillary palpi long, extending beyond tegulae, second article as long as next two together.

Mesonotum smooth, shining, notauli very strong and deeply impressed, minutely crenulate anteriorly, very coarsely crenulate posteriorly, where the crenulae converge and become confluent. Scutellum anteriorly with two ovate foveæ, rugose within and separated by a sharp carina; disk of scutellum small and smooth. Metanotum coarsely reticulate-rugose throughout, basal third with a median carina, which splits posteriorly to form a large diamond-shaped area; spiracle circular, on a distinctly raised prominence. Metapleura shallowly rugose posteriorly, disk

smooth. Mesopleura smooth and shining, with a very broad, short, longitudinal furrow on posterior half below the middle, from the anterior end of which a narrower furrow curves downward and forward; both of these furrows irregularly and partially crenulate.

Abdomen longer than head and thorax together, subpetiolate, subelliptical in outline; third, fourth, and fifth tergites widest; first tergite long, more than twice as wide at apex as at base and slightly longer than second tergite; first and second tergites with strong median carinae; third to sixth tergites much broader than long, third shortest, all swollen and with strongly constricted sutures; third, fourth, and fifth sutures strongly crenulate; first and second tergites coarsely, longitudinally, reticulate-rugose; third and fourth punctate-rugose on basal two thirds, becoming only sparsely punctate on the shining apical third; fifth shining and subobsoletely and sparsely punctate; sixth smooth and shining. Hind tibiae with two stout, curved spurs which are as long as fourth tarsal joint.

Stigma large, twice as long as wide, lower margin obtuse, angulate at middle where the radius is inserted; first abscissa of radius about half length of second; second cubital cell twice as long as wide, first transverse cubital oblique, second vertical; recurrent vein inserted near the first transverse cubital; intervening vein decolored; parallel vein inserted below. In hind wings the radius is subobsolete; nervellus oblique.

Luzon, Laguna, Mount Banahao (coll. Baker).

Genus *MACROSTOMION* Szepligeti

Differs from the new genus *Macrostomionella*, in Philippine species, as follows: Metanotum without lateral prominences, but with an indistinct, lanceolate, median area; spiracles circular; median carina of abdominal tergites extending to middle of fourth segment. The enlarged maxillary-palpus joints flattened, fourth joint more or less strongly twisted; stylate sixth joint with distinctly marked pseudojoints. Vertex back of ocelli long. Second cubital cell more strongly narrowed to apex.

The above note, as well as the descriptions of the species that follow, will indicate that our Philippine species agree with previously described species of the genus except in characters of scarcely more than specific value.

Macrostomion debilis sp. nov.

Ochraceous throughout; legs, antennae, palpi, and tegulae paler; lateral lobes of mesonotum and abdominal tergites somewhat

darker; intercellular area piceous. Wings faintly obscured, veins piceous, except the decolored second transverse cubital; stigma very pale; its broad costal margin ochraceous.

Male, length, 4.25 millimeters.

Head viewed from above with the medium-sized eyes strongly bulging; vertex back of ocelli long, gradually narrowed back of eyes; length of exposed cheek margins twice the distance from ocelli to eyes and equal to distance from ocelli to occipital carina; occipital carina evenly incurved; surface smooth and shining; ocelli on a slightly raised prominence, but not so strongly turned sidewise as in *Macrostomionella philippinensis*; distance between ocelli slightly less than distance to eyes, distance to occipital carina four times width between posterior ocelli; short radiating striæ in front of the anterior ocellus. Face very short, broader than long, broadened above on account of the deeply emarginate eyes, surface medially long-umbonate below antennæ, lateral areas and clypeus depressed, the former obscurely cross-striate; mouth opening large, elliptical, the upper margin strongly curved. Head viewed from side, with face margin strongly curved and very prominent at antennal scrobes; malar space small, length more than half width of cheeks; cheeks less than half width of eye, the margin parallel to eye margin, ocelli strongly prominent; eye large, its outline long and broadly subelliptical; maxillary palpi six-jointed with last four joints greatly modified; the first of these joints flattened, dilated, and squamous; second about as long, flattened, half as wide, and linear; the next shorter, narrower, flattened, and spindle-shaped in outline; last as long as preceding, slender, terete, and subdivided into about six pseudojoints; second modified joint somewhat bent and slightly twisted. Labial palpi four-jointed.

Pronotum narrowly exposed, its pleura nearly smooth. Mesonotum smooth and shining, notaüli deeply impressed, especially anteriorly, indistinctly crenulate, straight and converging at the middle of posterior border; lateral lobes strongly raised. Scutellum anteriorly with two deep and narrow foveæ, which are separated by a sharp median carina and have outer margins curved, hind margins oblique; posterior disk of scutellum small, smooth, and oval.

Metanotum with entire surface irregularly, longitudinally rugose, leaving a lanceolate median depression with raised margins, which is rough within; notum separated from pleura by a straight crenulated furrow just below the round spiracle; metapleura smooth; mesopleura smooth, without discal furrow.

Abdomen longer than head and thorax together, first tergite long trapezoidal, a little less than twice as wide apically as basally; length one and a half times width at apex; second tergite as long as first, gradually widened, its length a little greater than apical width; third, fourth, and fifth tergites shorter and broader, with a complete median carina running to middle of fourth tergite; first and second tergites and basal halves of fourth and fifth coarsely, irregularly, longitudinally striate; sixth and seventh tergites smooth and shining, sparsely punctate at base; first suture very strongly impressed, second, third, and fourth less so, all sutures indistinctly crenulate. Hind tibiae with two long, equal, curved spurs, which are as long as the three basal tarsal joints together; first hind tarsal joint slightly shorter than following three together.

Stigma large, about four times as long as broad, scarcely angulate at insertion of radius, which is distinctly before the middle; first abscissa of radius about half length of second; second cubital cell somewhat narrowed apically, more than twice longer than high; first transverse cubital very oblique, second vertical and decolored; recurrent vein entering first cubital cell at extreme apex, nearly interstitial; parallel vein inserted far below middle; submedian cell considerably longer than median.

Luzon, Laguna, Los Baños (coll. Baker).

Genus *MACROSTOMIONELLA* novum

Eyes very large, malar space and cheeks relatively small. Ocelli large, equidistant, rather strongly raised. Vertex back of ocelli rather short, about as long as ocellar area. Antennae longer than entire body; scape one and a half times as long as wide; funicle as long as wide and half length of scape; flagellar joints about three times as long as wide. Maxillary palpi longer than anterior femora, with third and fourth joints terete, but very greatly enlarged; diameter of first gradually increasing proximad until it is more than twice the diameter of anterior femora; fourth joint nearly as wide basally as the third apically and gradually narrowed to apex; first joint nearly twice as long as a mandible, fourth about three fourths as long, fifth joint short and broad, sixth stylate. Labial palpi stout, longer than long diameter of eye, second joint somewhat swollen and subequal to fourth in length, third shorter; upper tooth of mandibles projecting far beyond lower tooth.

Mesonotum trilobate, notauli deep, posterior median area very narrow and grooved. Scutellum quadrifoveate anteriorly. Metanotum with a very short median carina anteriorly, remainder

of its surface coarsely reticulate-rugose except for two large, depressed, laterobasal areas. Spiracle elliptical, not raised; lateral areas with blunt lateral prominences slightly below and behind the position of the toothed prominences in *Gyroneuron*. Disk of mesopleura with a very broad, impressed, centrally crenulate, oblique groove.

Radial cell reaching apex of wing. Radius inserted at basal two fifths of the long and rather narrow stigma. First abscissa of radius less than half length of second; second cubital cell more than twice as long as wide; first transverse cubitus oblique, second vertical and decolored. Recurrent vein inserted a short distance from apex of first cubital cell. Submedian cell longer than median by nearly length of transverse median. Parallel vein inserted at lower third, sinuous a little before insertion.

Abdomen sessile, longer than head and thorax together, beyond first segment narrowly elliptical in outline; second tergite as long as wide apically or longer, remainder broader than long; first and second tergites and basal half of third tergite medially carinate; sutures not depressed, but basal surfaces of fourth, fifth, and sixth tergites strongly depressed. Hind tibial spurs slender and longer than fourth tarsal joint, slightly curved and naked.

Type, *Macrostromionella philippinensis* sp. nov.

This genus belongs to the group of genera including *Cystomastax*, *Macrostromion*, and *Pelecystoma*. In *Macrostromion* only has a species been described from the Oriental Region. The present genus is perhaps nearest to *Cystomastax*, described from Peru, but it differs in the structure of the metanotal spiracles, the radial vein, the submedian cell, and the first and second abdominal segments. The grouping of a series of genera on modified maxillary palpi is, I believe, unnatural; but it will have to be continued, in part, until the species and genera formerly described shall have been reexamined and more fully studied and characterized. It seems certain that the modified palpi have appeared in several distinct genetic lines.

Synopsis of the species.

- a'. Posterior ocelli nearer to occipital carina than once their diameter; abdominal tergites finely, longitudinally reticulate-rugose; stigma little narrowed to a blunt apex; second transverse cubital oblique. *philippinensis* sp. nov.
- a'. Posterior ocelli distant from occipital carina by one and two-thirds times their diameter; abdominal tergites very strongly and coarsely, longitudinally anastomose-rugose; stigma rapidly narrowed to an acute apex; second transverse cubital vertical..... *similis* sp. nov.

Macrostomionella philippinensis sp. nov.

Basal joints of antennæ, vertex, prothorax, mesothorax, and middle and hind coxæ bright ferruginous, the latter darker apically. Flagella, lower part of head, mandibles (excepting the black teeth), palpi, fore coxæ, and legs stramineous; middle and hind femora apically tinged with yellow. Wings slightly obscured, stigma and veins piceous, areas at apices of radial, third cubital, and third discoidal cells smoky.

Female, length, 6.5 millimeters; ovipositor very short, scarcely projecting.

Head viewed from above with vertex back of ocelli very short, although well filled behind eyes, the surface obscurely, punctulately roughened; ocelli very large, nearer to eyes, to the occipital carina, and to each other than once their own diameter. Face somewhat longer than broad, narrowed at middle by the incurving of the eyes, medially long-umbonate and narrowly smooth below antennæ, lateral areas horizontally striate; mouth opening large and elliptical; eyes strongly emarginate opposite antennæ. Head viewed from side with umbonate portion of face very strongly projecting, malar space as long as width of eye; cheek broad, outer margin parallel to eye margin; eye outline very short and broadly elliptical; second to fourth joints of maxillary palpi enormously swollen, subequal in length; second joint long urn-shaped, twice as long as wide at the truncate tip; third joint narrower than second, ovate; fourth joint half width of third and spindle-shaped; fifth joint stylate.

Mesonotum shining; subobsoletely, punctulately roughened; notauli anteriorly very broad and crenulate, becoming obsolete posteriorly in a broad strong impression, which has a narrow, obscurely pitted, median groove. Scutellum anteriorly with two oblique foveæ, smooth within and separated by a sharp carina; disk of scutellum smooth and nearly twice as long as broad. Metanotum coarsely and strongly reticulate-rugose, with a rudiment of a median carina at base and with a blunt projection on either side in the position of the spines in *Gyroneuron*, to the summits of which pass a number of radiating rugæ; spiracles elliptical, not at all raised. Mesopleura smooth.

Abdomen subsessile, subelliptical, lateral margins of first three tergites in a straight line; first tergite long and narrow, gradually broadened apically, twice as long as wide at apex; second tergite as long as first, gradually broadened apically; third and following, including the fully exposed seventh, progressively shorter and, after the third, narrower; first and second and basal

half of third with a sharp median carina; all tergites, except seventh, finely, longitudinally reticulate-rugose; seventh shining, sparsely, shallowly punctate. Hind tibiae with two long, curved, subequal, naked spurs, which are longer than fourth tarsal joint.

Stigma very long and narrow, more than four times as long as wide; radius inserted at basal third, apical two thirds only slightly narrowed to the rather blunt apex; first abscissa of radius about one third length of second; second cubital cell three times as long as wide; both transverse cubitais oblique and decolored, the first angulate at middle; recurrent vein inserted a short distance before first transverse cubital, intervening vein decolored; parallel vein inserted a little below middle. In hind wings second recurrent joins anterior vein at origin of radius, which is strong and dark like the other veins; nervellus oblique.

Luzon, Laguna, Mount Maquiling (coll. Baker).

This very remarkable insect is unique among the Rhogadini of the Philippines, not only in its extraordinary maxillary palpi, but in the wing color, in the stigma, and in the sculpturing of face and of mesonotum.

Macrostomionella similis sp. nov.

Ochraceous; borders of mesonotum piceous; intercellular area, mesonotum, and abdominal dorsum irregularly black on median half. Antennae piceous; wings faintly smoky, veins and stigma pale sordid stramineous; costal margin of stigma much brighter; basal vein dark.

Male, length, 5.5 millimeters.

Head viewed from above with eyes strongly bulging beyond head outline, vertex back of eyes slightly shorter than ocellar area, but longer than exposed cheek margin; the surface with a few subobsolete punctures; ocelli very large, nearer to eyes and to each other than once their own diameter, but one and two-thirds times their diameter from the occipital margin. Face subquadrate, slightly broader than long, sides nearly parallel; surface subobsoletely punctate-rugose, medially very short-carinately elevated below antennae; mouth opening broadly elliptical; clypeus semilunate, width one and one-half times the length, basal suture highly arched; clypeal pits twice their diameter from eyes; eyes very gently emarginate at antennae. Head viewed from side with upper part of face very strongly projecting; malar space longer than lower width of cheek; cheek below, one third diameter of eye, gradually narrowing above; ocelli prominent; eye outline broadly elliptical, broader on upper

half than on lower half; maxillary palpi longer than anterior femora, with third and fourth joints a little flattened, but very greatly enlarged, diameter of first gradually increasing proximad until it is more than twice the diameter of anterior femora, fourth joint nearly as wide basally as third apically and gradually narrowed to apex; length of first joint nearly twice length of a mandible, fourth about three fourths as long, fifth joint short and broad, sixth stylate. Labial palpi stout, longer than long diameter of eye, second joint somewhat swollen and subequal to fourth in length, third joint shorter.

Mesonotum trilobate, shining, subobsoletely punctulate. Notauli deeply impressed and strongly crenulate as far as the middle of the narrow postero-median area, which has a long, strongly pitted median groove. Scutellum anteriorly with two very large foveæ, each of which has a low, rudimentary median carina. Disk of scutellum punctulate, a little longer than broad. Metanotum coarsely and strongly reticulate-rugose, a rudiment of median carina at base and a blunt projection on either side in the position of the spines in *Gyroneuron*, to the summits of which pass a number of radiating rugæ; spiracle elliptical, not at all raised. Mesopleura smooth, posterior submargin crenulate, anterior submargin indistinctly, sparsely, longitudinally striate, on posterior half of disk with a short and broad longitudinal furrow, which is crenulate only near the upper border.

Abdomen subsessile and subelliptical; lateral margins of first three segments, except base of first, in a straight line; first tergite broad, the length one and one-half times the apical width, gradually narrowing proximad on apical two thirds, but narrowed suddenly on basal third; second tergite as long as first, gradually broadened apically; third and following, including the very short seventh and eighth, progressively shorter and, after the third, narrower; first and second tergites with a distinct median carina; all tergites, except seventh and eighth, coarsely, strongly, longitudinally rugose with frequent anastomosings. Hind tibiae with two long, curved, subequal spurs, which are longer than fourth tarsal joint.

Stigma long and narrow, more than four times as long as wide, radius inserted at basal third, apical two thirds rapidly narrowed to an acute apex; first abscissa of radius more than one third, but less than one half, length of second; second cubital cell two and one-half times as long as wide; first transverse cubitus oblique and straight, the second vertical and decolored; recurrent vein inserted a short distance before apex of first cubital cell,

the intervening vein decolored; parallel vein inserted a little below middle.

LUXON, Laguna, Mount Maquiling (coll. Baker).

While *Macrostomionella philippinensis* and *M. similis* differ in a number of striking details, still they coincide in all important generic characters. In color pattern the latter species bears a remarkable resemblance to *Rhogas cameroni* sp. nov.

Genus MEGARHOGAS Szepligeti

This genus, based on two inadequately described species, appeared first in Szepligeti's Braconidae,² the two species, *longipes* and *minor*, being from Celebes. On Plate II, fig. 26, is illustrated a species called *M. luteus* Szepl., which is not otherwise mentioned in the work, even in the Errata.

No Philippine species shows the strongly clavate abdomen as illustrated for *M. luteus*, although our species are clearly congeneric.

Synopsis of the species.

- a'. First abscissa of cubitus and first transverse cubitus forming an acute angle.
- b'. Radius in hind wings nearly parallel to costa; notauli, except anteriorly, not distinctly crenulate; mesopleura with a strong, oblique, discal furrow; first abscissa of cubitus bisinuate; transverse median vein vertical; stigma piceous... *stigmatus* sp. nov.
- b'. Radius in hind wings strongly upcurved at middle toward costal; notauli strongly crenulate; mesopleura without oblique discal furrow; first abscissa of cubitus evenly upcurved; transverse median vein very oblique; stigma stramineous *philippinensis* sp. nov.
- a'. First abscissa of cubitus and first transverse cubitus forming a right angle; radius in hind wings strongly upcurved at middle toward costa.
- c'. Stigma largely piceous; general color obscure ferruginous; length, 10 millimeters *mindanensis* sp. nov.
- c'. Stigma piceous only on upper posterior border; general color ochraceous; length, 8 millimeters *szepligetii* sp. nov.

Megarhogas stigmatus sp. nov.

Pale ferruginous, the abdomen darker above; interocellar area piceous; antennæ piceous, paler at extremities. Wings irregularly suffused with pale ochraceous on basal half, remainder very pale smoky; veins ochraceous; stigma piceous.

Female, length, 16 millimeters.

Head viewed from above not strongly transverse; eyes very large and very strongly bulging; vertex not rapidly narrowing back of eyes, but with the cheek margin strongly bulging;

² Wytsman's Genera Insectorum (1904), 83.

occipital carina broadly incurved and subangulate at middle; length of exposed cheek margin one and a half times the distance from ocelli to eyes, the latter distance but little less than that from ocelli to occipital carina and subequal to long diameter of an ocellus; surface of vertex smooth and shining; ocelli large, separated by about half their long diameter; surface at sides and in front of anterior ocelli shallowly, radiately wrinkled.

Face about as long as wide above at the deeply emarginate eyes; eye margins strongly outcurved below; surface strongly, medially, subumbonately raised on upper half, on either side a short depressed area above clypeal pit; face shallowly, transversely wrinkled, discontinuously on umbo; clypeus short, transverse, basal suture subobsolete, clypeal pits close to eyes; mouth opening very large and broad, broadly elliptical, lower clypeal margin nearly straight; entire surface of mandibles strongly, sparsely punctate.

Head viewed from side with face somewhat prominent above; cheeks broad throughout, half width of eye, outer margin parallel with eye margin, surface smooth and shining; malar space very small, its length less than half width of cheek, its surface together with a narrow curved area about lower margin of eye, cross-striate; eye short and very broadly subelliptical, broadest on lower half.

Mesonotum deeply trilobate, smooth and shining, notauli deeply impressed, crenulae apparent only near anterior extremities, terminating posteriorly on the sides of a long, narrow, deep median furrow on posteromedian area. Scutellum anteriorly with two large and rather shallow foveæ, separated by a sharp median carina; posterior disk of scutellum smooth. Postscutellum with two small median foveæ separated by a sharp carina; lateral areas rugose. Metanotum shallowly reticulate-rugose on anterior third, very strongly, but irregularly, transversely rugose on posterior two thirds, with a complete, but partly sinuous, median carina; below the elliptical spiracle a longitudinal carina passes to anterior border, while posteriorly a foveated furrow extends to posterior border; metapleura shining, obscurely roughened; mesopleura smooth and shining, with a short crenulated furrow within an oblique discal impression in lower half; a few short vertical rugæ below wing.

Abdomen pedicellate, about twice the length of head and thorax together, gradually widened to third tergite, six tergites fully exposed; first tergite very slender from base to spiracles, which

are situated at two fifths of length from base, thence very gradually widened to apex, width at base about half that at spiracles and one fourth that at apex; length about two and one-half times width at apex; length of second tergite a little less than twice width at apex and slightly longer than first; third and fourth tergites distinctly broadened apically, with the postero-lateral angles prominent; fifth tergite subquadrate; third, fourth, and fifth tergites subequal in length and width and shorter and broader than second; fifth a little shorter, smooth and shining, decolored, narrowed somewhat to the incurved apex; sixth tergite retracted, first to fifth tergites longitudinally rugose, the rugae freely anastomosing, becoming obsolete at extreme apex of fifth tergite; a continuous median carina on first three tergites, finer on third; first suture sharply impressed, postero-lateral angles of first segment acutely produced; second and third sutures strongly depressed and crenulate, the latter constricted, fourth and fifth sutures slightly constricted, the former crenulated at sides; second tergite with shallow gastrocels. Hind tibiae with two stout curved spurs, as long as fourth tarsal joint; hind tibiae and tarsi long and slender, the first tarsal joint as long as three following together.

Stigma long and narrow, about four times as long as wide at insertion of radius, where the margin is straight and not at all angulate; first abscissa of radius about one fourth length of second; second cubital cell three times as long as wide, slightly broader at base; first transverse cubitus nearly vertical below, on upper third swollen and bent at beginning of swollen portion; second transverse cubitus nearly vertical and decolored, second abscissa of radius swollen at base; first abscissa of radius strongly bisinuate; recurrent vein joining cubitus at extreme apex of first cubital cell, intervening vein decolored; parallel vein inserted at lower fourth; submedian cell considerably longer than median; transverse median vein vertical.

MINDANAO, Davao (coll. Baker).

Megarhogas philippensis sp. nov.

Dark ochraceous; abdomen ferruginous; interocellar area, a large spot on propleura, two separated spots on disk of mesopleura, and fore femora at extremities, piceous. Wings slightly suffused with ochraceous; veins ochraceous.

Female, length, 15 millimeters.

Head viewed from above not strongly transverse, eyes very large and very strongly bulging; vertex back of ocelli short and rapidly narrowing behind eyes, occipital carina nearly straight,

slightly trisinuate; length of exposed cheek margin one and one-half times the distance from ocelli to eyes, the latter distance three fourths of that from ocelli to occipital carina or three fourths the long diameter of an ocellus; surface of vertex smooth and shining; ocelli large, separated by about half their diameter; surface in front of anterior ocellus shining and obscurely, sparsely, radially striate.

Face as long as wide above, where the eyes are rather deeply emarginate, narrowed below by the strongly curving eye margins; surface slightly raised medially and with an obscure fold next to eye, shining and faintly, longitudinally wrinkled above, and with few scattered obscure punctures; mouth opening elliptical, very broad, its upper margin broadly curved; clypeus short, transverse, the basal suture subobsolete, clypeal pits close to eyes; outer surface of mandibles minutely roughened.

Head viewed from side with face evenly curved below antennae; cheeks rather broad below, about one third breadth of eye, slightly broader above; malar space and cheek smooth and shining; eye short and very broadly subelliptical, broadest on lower half.

Mesonotum deeply trilobate, smooth or minutely roughened, shining, notauli deeply impressed, conspicuously crenulate and terminating posteriorly at the middle of the narrow, sharply rimmed, median furrow on posteromedian area. Scutellum anteriorly deeply bifoveate, foveæ separated by a sharp median carina; disk of scutellum nearly smooth, its tip crossed with piceous. Postscutellum with a large subcircular median fovea, which is rugose within. Metanotum strongly rugose, its surface very uneven; a shallow median furrow is crossed by irregular rugæ, but followed apically by a very short median carina; on either side of the median furrow at one third the length from apex is a low, irregular, crested area from which rugæ radiate; spiracle elliptical, an irregular, longitudinal carina passing forward from just below spiracle, a longitudinal depressed area with transverse rugæ posterior to it; metapleura rugose; mesopleura below and anteriorly obscurely rugose, remainder nearly smooth, on posterior one fourth with a blunt vertical ridge; depressed area beneath wing broad and shallow.

Abdomen subpedicellate, nearly twice the length of head and thorax together, widest at third tergite; six tergites fully exposed; first tergite very slender basally to spiracles, which are situated at one third of length from base, thence very gradually widening to apex, width at base about one half that at spiracles

and one third width at apex; length of second tergite twice the width at apex and about equal to length of first; third, fourth, and fifth tergites quadrate, parallel-sided; third and fourth about three fourths length of second; fifth a little shorter; sixth narrower than fifth and three fourths its length, narrowed toward the concave-margined apex, smooth and shining; first to fifth tergites thickly, longitudinally rugose, this becoming obsolete on apical half of fifth tergite; a strong continuous median carina extends to apical fourth of third tergite; a rudimentary median carina near base of fourth tergite; first suture sharply impressed, its borders on both segments carinately margined, posterolateral angles of first segment acutely produced; second and third sutures somewhat depressed and distinctly crenulated; fourth suture a little constricted, but not crenulate; second tergite with shallow gastrocoeli. Hind tibiae with two stout curved spines as long as fourth tarsal joint; hind tibiae and tarsi very long and slender; first tarsal joint as long as three following together.

Stigma long and narrow, four times as long as wide at insertion of radius where the margin is straight; first abscissa of radius about one fourth length of second; second cubital cell three times as long as high, not at all narrowed toward apex; first transverse cubitus nearly vertical below, on upper third swollen and bent at beginning of swollen portion; second transverse cubitus nearly vertical and decolored; second abscissa of radius swollen at base; first abscissa of cubitus strongly upcurved and inserted near costa; recurrent vein joining cubitus at extreme apex of first cubital cell, intervening vein decolored; parallel vein inserted at lower fourth; submedian cell a little longer than median; transverse median vein very oblique.

Luzon, Laguna, Los Baños (coll. Baker).

Megarhogas mindanaensis sp. nov.

Pale ferruginous with darker shadings on lateral lobes of mesonotum, lateral areas of metanotum, apical half of first abdominal tergite, median line and two lateral spots on third tergite, apical half of fourth tergite, all of fifth and sixth tergites, and upper surface of hind coxae. Interocellar area piceous. Flagella bright ferruginous basally, paler apically. Wings suffused with a pale smoky tinge and with a broad, decolored, transverse band at two thirds of length from base. Veins in wings all ferruginous, stigma piceous in basal half, stramineous on apical half.

Female, length, 10 millimeters.

Head viewed from above not strongly transverse, eyes very

large and very strongly bulging; vertex back of ocelli short and rapidly narrowing behind eyes, but with cheek margin not outcurved; occipital carina forming a very broadly obtuse angle at middle; length of exposed cheek somewhat more than twice distance from ocelli to eyes, the latter distance about half the distance from ocelli to occipital margin and half long diameter of an ocellus; ocelli very large, the two posterior separated by less than half their diameter, the anterior more widely separated; surface of vertex behind ocelli smooth and shining; surface in front of anterior ocelli shallowly, sparsely, radiately wrinkled.

Face as long as wide above, where the eyes are deeply emarginate, narrowed below by the strongly outcurved eye margins; surface raised along median line, depressed on midlateral areas and obscurely and irregularly transversely rugose-punctate, except medially; clypeus transverse, basal suture subobsolete, apical margin little incurved; clypeal pits close to eyes; mouth opening broadly elliptical; second joint of labial palpi and third joint of maxillary palpi apically somewhat swollen; outer surface of mandibles minutely roughened.

Head viewed from side with face strongly prominent below antennæ; cheek narrow, outer margin parallel with eye margin, below about one fourth breadth of eye; malar space very small, its length about three fourths width of cheek; both malar space and cheek smooth and shining, but with a very small cross-striate area next to lower eye margin; eye very large, subelliptical, broadest on lower half.

Mesonotum deeply trilobate, smooth or minutely roughened, and shining; the notauli deeply impressed, minutely crenulate, and terminating posteriorly at the middle of the narrow median furrow on posteromedian area, scutellum anteriorly bifoveate, foveæ separated by a sharp median carina; posterior disk nearly smooth, long-acute triangular. Postscutellum with four small foveæ separated by sharp carinæ, median carina the strongest. Metanotum coarsely reticulate-rugose; a sharp-rimmed, median, lanceolate area crossed by three transverse rugæ; posterior lateral areas somewhat prominent, below with radiating rugæ; spiracle elliptical, a longitudinal carina just below it, extending one half length of metanotal margin; metapleura broadly depressed posteriorly, and with a few irregular rugæ about border of depressed area, very shallowly rugose anteriorly, a deep furrow near anterior margin is crenulate above; mesopleura smooth and shining, posterior border crenulate, disk

with a longitudinal, crenulate furrow, anteriorly bent downward, two small depressed areas beneath wings, anterior border finely rugose.

Abdomen subpedicellate, about one and three-fourths times length of head and thorax together, widest at third, fourth, and fifth segments; six segments fully exposed; first segment slender basally to spiracles, which are two fifths of the length from base, thence very gradually widened to apex, width at base about two thirds that at spiracles and one third that at apex, the length about three times width at apex; length of second segment one and one-half times the width at apex and slightly shorter than first; third segment three fourths length of second, somewhat broadened apically, apical width a little greater than length; fourth and fifth segments quadrate, fourth subequal to third in length, fifth a little shorter; sixth narrower than fifth and three fourths its length, narrowed toward the straight margined apex and smooth and shining; first to fifth tergites thickly, longitudinally rugose, this becoming obsolete on apical half of fifth tergite, where the surface is minutely and obliquely wrinkled; a strong continuous carina extends to near apex of third tergite; first suture slightly impressed, posterior lateral angles of first segment acutely produced, median portion of hind margin somewhat raised; second and third sutures broadly and shallowly depressed and long crenulate; second tergite with long narrow gastrocoeli. Hind tibiae with two stout curved spines, as long as fourth tarsal joint; hind tibiae and tarsi not as long and slender as in *M. philippinensis*, the first hind tarsal joint as long as the three following together.

Stigma long and narrow, three and one-half times as long as wide at insertion of radius, which is one third of the length from base, and here the margin is straight; first abscissa of radius about one third length of second, second cubital cell three times as long as wide, distinctly narrowed on apical half, first transverse cubitus oblique, slightly curved and decolored at lower extremity, bent and swollen at upper extremity; second transverse cubitus curved, nearly vertical, and decolored; second abscissa of radius strongly curved and swollen on basal third; first abscissa of cubitus curved downward on basal half; recurrent vein joining cubitus near apex of first cubital cell, intervening vein decolored; parallel vein inserted at lower eighth; submedian cell a little longer than median, transverse median vein vertical.

MINDANAO, Davao (coll. Baker).

Megarhogas asepligetii sp. nov.

Pale ochraceous, becoming bright ferruginous on antennæ, hind coxae, femora, and tibiae, and darker on fourth to sixth tergites; interocellar area piceous. Wings faintly obscured, smoky, and with an indistinct paler transverse band on apical third; veins brown, upper basal margin of stigma darker.

Male, length, 8 millimeters.

Head viewed from above not strongly transverse, eyes very large and strongly bulging; vertex back of ocelli short, rapidly narrowing behind eyes, exposed cheek margin nearly straight; occipital carina straight, not incurved; length of exposed cheek margin scarcely twice the distance from ocelli to eyes, the latter distance more than half the distance from ocelli to occipital margin and two thirds the long diameter of an ocellus; ocelli of medium size, separated by about half their diameter; surface of vertex behind ocelli smooth and shining; surface in front of anterior ocellus wrinkled only over insertions of antennæ.

Face about as long as wide above where the eyes are deeply emarginate, narrowed below by the strongly outcurved eye margins; surface slightly raised along median line on upper half, slightly, longitudinally depressed on midlateral areas; lateral areas finely, shallowly, obliquely rugose; clypeus transverse, basal suture subobsolete, apical margin broadly incurved; clypeal pits close to eyes; mouth opening broad, elliptical; outer surface of mandibles minutely roughened.

Head viewed from side with face strongly prominent below antennæ; cheeks narrow, outer margin parallel with eye margins, below about one fourth width of eye; malar space very small, its length about three fourths width of cheek; both malar space and cheek smooth and shining; eye very large, subelliptical, broadest on lower half.

Mesonotum trilobate, smooth or minutely roughened, and shining, notauli deeply impressed, minutely, obscurely crenulate, more strongly so posteriorly, terminating posteriorly at middle of the narrow median furrow on posteromedian area. Scutellum anteriorly bifoveate, the foveæ separated by a sharp median carina; posterior disk nearly smooth, long triangular. Postscutellum with two small median foveæ separated by a sharp carina, their outer margins oblique. Metanotum reticulaterrugose; a sharp-rimmed, median, lanceolate area crossed by three transverse rugæ; posterolateral areas somewhat prominent and below with radiating rugæ; spiracle elliptical, and below it a longitudinal carina passing forward; metapleura depressed

on posterior third, and there with a few strong irregular rugae, anteriorly finely rugose; mesopleura smooth and shining on disk, an impressed crenulate furrow crossing entire disk in line of long axis of body; below wings with a marginal depressed area, anterior border and area below longitudinal groove shallowly rugose.

Abdomen subpedicellate, one half longer than head and thorax together, widest at fourth segment, seven segments fully exposed; first segment slender basally, evenly broadened to apex; width at base nearly half that at apex, the length about two and one-half times the width at apex; length of second segment about one and one-half times width at apex and slightly shorter than first segment; third segment three fourths length of second, a little broadened apically, apical width slightly greater than length; fourth and fifth segments quadrate, fourth slightly shorter than third, fifth a little shorter; sixth narrower than fifth and three fourths its length; sixth one half length of fifth, smooth and shining, and its apical margin broadly incurved; only the point of seventh visible; first to fifth tergites thickly longitudinally rugose, this becoming obsolete on apical half of fifth tergite, where the surface is minutely roughened; a strong, continuous carina extends to apex of third tergite; first suture sharply impressed, posterolateral angles of first segment acutely produced, median portion of hind margin somewhat raised; second suture shallowly, broadly depressed, and long crenulate; third, fourth, and fifth sutures more strongly and narrowly depressed and crenulate; second tergite with small gastrocels. Hind tibiae with two short curved spines, the inner longer, as long as fourth tarsal joint; first hind tarsal joint as long as the three following together.

Stigma long and slender, three and one-half times as long as wide at insertion of radius, which is one third of length from base, and here the margin is straight; first abscissa of radius about one third length of second; second cubital cell twice as long as widest part, distinctly narrowed on apical half, first transverse cubitus oblique, straight and decolored at lower extremity, slightly bent, swollen at upper extremity; second transverse cubitus curved, nearly vertical, and decolored; second abscissa of radius curved and swollen on basal third; recurrent vein joining cubitus very near apex of first cubital cell, intervening vein decolored; parallel vein inserted at lower sixth; submedian cell longer than median; transverse median vein slightly oblique.

Luzon, Laguna, Mount Maquiling (coll. Baker).

This species is similar to *M. mindanaensis* in most respects, but is strikingly distinct in the structure of its mesopleura.

Genus **TRIGONOPHATNUS** Cameron

Synopsis of the species.

- a'. Antennae and stigma piceous..... *nigricornis* sp. nov.
c'. Antennae and stigma pale ochraceous..... *philippinensis* sp. nov.

Trigonophatnus nigricornis sp. nov.

Ochraceous, slightly darker on abdominal tergites, ovipositor concolorous; intercellular area and antennae piceous, scape paler; wings faintly obscured, stigma and veins piceous, except de-colored second transverse cubital and transverse median.

Female, length, 6 millimeters; ovipositor very short, about as long as sixth tergite.

Head viewed from above with the medium-sized eyes strongly bulging; vertex back of ocelli long, roundly narrowed back of eyes; length of exposed cheek margin nearly as great as distance from ocelli to occipital carina, the occipital carina very strongly curved; surface of vertex smooth and shining; ocelli small, farther from eyes than from each other, about four times as far from occipital carina as from each other, with short radiating striae about the anterior ocellus. Face short, broader than long, broader above, due to the fact that the eyes are deeply emarginate opposite antennae; surface with a median carina to near clypeus, lateral areas cross-striate, more strongly so above; mouth opening very large, subcircular, the upper margin thus strongly curved. Head viewed from side with face margin curved and strongly projecting at antennal scrobes; malar space rather small, length about half width of eye; cheek very broad, broader than length of malar space and slightly broader above than below, the margin subparallel to eye margin; ocelli rather strongly projecting; eye outline short and broadly subelliptical; maxillary palpi slender and very hairy, six-jointed, first two joints short, remainder subequal in length; labial palpi four-jointed.

Mesonotum smooth and shining; notauli very deep, broad, and coarsely crenulated anteriorly, becoming much smaller and weaker, disappearing in the posterior median depression, which has a small median groove. Scutellum with two subcircular foveæ anteriorly, which are separated by a sharp carina and are smooth within; posterior disk of scutellum smooth. Metanotum with six or eight discal striae on posterior half, which converge at apical border; at the side above the large round

spiracle is an oblique crenulate depression, passing to apical margin; below the spiracle a fine lateral carina curves about the lower half of spiracle and thence passes irregularly to apical margin; below this carina, on the pleura, an oblique crenulated depression; remainder of pleura smooth. Mesopleura smooth and shining, without discal furrow.

Abdomen longer than head and thorax together; first segment sessile, twice as broad at apex as at base, length one and one-half times width at apex; second tergite as long as first, width at apex nearly equal to length; third, fourth, fifth, and sixth subequal in length, fourth very broad; first tergite medially carinate only on basal half, second only on basal three fourths; first four tergites finely, densely, longitudinally reticulate-rugose; fifth weakly punctate-striate at base only, the remainder of fifth together with sixth smooth and shining; third and fourth sutures only, deeply impressed and crenulate. Hind tibiae with two long, equal, curved spurs; first hind tarsal joint as long as three following together.

Stigma large, about five times as long as broad, not at all angulate at insertion of radius, this being nearer to base than to apex; first abscissa of radius a little less than half length of second; second cubital cell more than twice as long as high; first transverse cubital very oblique, second nearly vertical; recurrent vein interstitial; parallel vein inserted below middle; submedian cell considerably longer than median.

Luzon, Laguna, Mount Maquiling (coll. Baker).

Trigonophataus philippensis sp. nov.

Ochraceous throughout; legs, antennæ, palpi, and tegulae somewhat paler; interocellar area piceous; wings faintly obscured, stigma and veins on apical half of wing ochraceous, on basal half piceous, second transverse cubital and recurrent veins decolored.

Female, length, 6.5 millimeters; ovipositor as long as sixth tergite; hypopygium very large.

Head viewed from above with the medium-sized eyes strongly bulging, vertex back of ocelli short, strongly narrowed back of eyes; length of exposed cheek margin nearly twice the distance from ocelli to eyes and greater than the distance from ocelli to occipital carina; occipital carina subangulate at center; surface of vertex smooth and shining; ocelli on a distinctly raised prominence and directed strongly sidewise, of medium size, distance between them subequal to the distance to eyes; distance to occipital carina twice width between posterior ocelli; short

radiating striae in front of anterior ocellus. Face very short, broader than long, broadened above on account of the deeply emarginate eyes, surface medially long-umbonate below antennae, lateral areae and clypeus depressed, the former obscurely cross-striate above; mouth opening very large, subcircular, upper margin very strongly curved. Head viewed from side with face margin strongly curved and very prominent at antennal scrobes; malar space small, length a little more than half width of cheeks; cheeks broad, more than half width of eye, margin parallel to eye margin; ocelli strongly prominent; eye large, its outline long and broadly subelliptical; of last four joints of maxillary palpi the second is longest.

Pronotum nearly hidden by the strongly projecting middle lobe of mesonotum. Mesonotum shining and nearly smooth; notauli very deep, coarsely crenulated anteriorly, becoming broader, shallower, and more obscurely crenulated where they enter the very wide posterior depression, the last with a short median groove, anterior to which the surface is obscurely punctate-striate. Scutellum anteriorly with two large subquadrate foveæ, separated by a sharp median carina, roughened within, and with curved outer margins; posterior disk of scutellum smooth.

Metanotum with a thick median carina and on either side a submedian, finer carina, these forming an elongate median area, which is broader posteriorly; remainder of surface irregularly and obscurely punctate-rugose; below the round spiracle, which is set in a circular depressed spot, is an oblique crenulated furrow passing to apical margin; remainder of metapleura smooth; mesopleura rugose anteriorly and below, disk without oblique furrow.

Abdomen longer than head and thorax together; first segment twice as wide apically as basally, length one and one-half times width at apex; second as long as first, gradually broadening apically, the length more than apical width; third and fourth subequal (much shorter than second); fifth a little longer; sixth a little shorter, fourth widest; first four tergites finely longitudinally reticulate-rugose; fifth segment at base obscurely punctate-rugose, remainder and sixth segment smooth and shining; first and second tergites with distinct median carina on basal halves only; second, third, and fourth sutures shallowly depressed and crenulate. Hind tibiae with two long, equal, curved spurs; first hind tarsal joint as long as three following together.

Stigma large, about three times as long as broad, broadest

and subangulate at insertion of radius, this being a little before middle; first abscissa of basal vein somewhat swollen; first abscissa of radius about half length of second; second cubital cell more than twice longer than wide; first transverse cubital very oblique, second nearly vertical; recurrent vein joining cubitus a little before first transverse cubitus, intervening vein decolored; parallel vein inserted far below middle; submedian cell considerably longer than median.

Luzon, Laguna, Mount Maquiling (coll. Baker).

Genus RHOGASELLA novum

Eyes large, cheeks narrow, but malar space relatively large. Ocelli small, equidistant or the anterior somewhat removed. Vertex back of ocelli of medium size, longer than ocellar area and with or without an impressed median line. Antennæ longer than entire body; scape slender, little narrowed proximally, twice as long as wide; funicle longer than wide and half length of scape; flagellar joints twice as long as wide. Maxillary palpi longer than anterior femora, with third and fourth joints long, subequal, and terete.

Mesonotum strongly trilobed; notauli deep; posterior median area grooved and very narrow; scutellum bifoveate anteriorly, each fovea partially subdivided by a rudimentary carina. Metanotum sparsely rugose, with a short median carina anteriorly, behind passing into an irregular lozenge-shaped area, which may have an irregular median groove; midlateral areas with slight prominences; spiracle large, elliptical, not raised. Disk of mesopleura with a broadly impressed, centrally crenulate, oblique groove.

Radial cell reaching apex of wing. Radius inserted near middle or at basal two fifths of the long, narrow stigma. First abscissa of radius about half length of second; second cubital cell twice as long as wide; first transverse cubitus oblique; second vertical and decolored. Recurrent vein inserted a short distance from apex of first cubital cell. Submedian cell as long as median on the median vein, transverse median vein interstitial with basal. Parallel vein inserted at lower third, but appearing interstitial by reason of the posterior vein being obsolete beyond second discoidal cell.

Abdomen sessile, longer than head and thorax together, narrowly elliptical in outline, with six fully exposed tergites in female; second tergite at apex wider than long and subequal to first, remainder subequal and about two thirds length of first;

first or first and second tergites, medially carinate; all tergites shallowly striate, the striae on lateral portions of third, fourth, and fifth tergites somewhat oblique; second suture crenulately impressed and strongly curved; basal surfaces of fourth and fifth tergites strongly depressed. Hind tibial spurs short, straight, and pubescent.

Type, *Rhogasella straminea* sp. nov.

Synopsis of the species.

- a'. Ocelli set in a depressed area, the anterior not farther removed than distance between posterior; occipital margin (viewed from above) wide and deeply incurved; first and second tergites with a distinct median carina; dorsum of abdomen not medially piceous. *straminea* sp. nov.
- a". Ocelli not set in a depressed area, the anterior much farther removed than distance between posterior; occipital margin narrowed and nearly straight; first tergite only with distinct median carina; dorsum of abdomen medially piceous. *lineata* sp. nov.

Rhogasella straminea sp. nov.

Antennæ and thorax ochraceous; head, abdomen, and legs stramineous; abdomen and tarsi distally darkened. A small mark at base of metanotum, interocellar area, and sutures of flagella piceous. Wings very faintly obscured, stigma and veins stramineous, the latter darker basally. Ovipositor ochraceous, longer than depth of last abdominal segment and hypopygium together.

Female, length, 5.5 millimeters.

Head viewed from above with large nonbulging eyes, which deeply enter head; vertex back of ocelli long and with a median incised line; occipital margin wide and broadly, deeply incurved; exposed margin of cheek as long as twice distance from ocelli to eyes, posterior length of vertex three times the latter distance; surface of vertex smooth and shining; ocelli small, seated in a depressed area, separated by a little less than their long diameter, the anterior not farther removed, the posterior slightly farther from eyes than their long diameter. Face subquadrate, as long as broad, subobsoletely, transversely, and irregularly punctate-striate; medially umbo-carinately raised just below antennæ; mouth opening narrow, subelliptical; clypeus with basal suture highly arched, apical margin less strongly curved; clypeal pits distant from eyes about twice their diameter. Head viewed from side with face margin strongly projecting, especially at antennæ, but very slightly curved at middle; ocellar area not raised; cheeks narrow, about one fourth the lower width of eyes, outer margin parallel to eye margin; malar

space long, its length about twice the lower width of cheek; eye large, its outline very broad and bluntly elliptical, but a little narrower on lower half. Maxillary palpi slender, terete, third and fourth joints long, subequal in length, and longer than fifth and sixth together. Antennae longer than entire body, scape slender, little narrower at base, twice as long as wide; funicle narrower and half as long as scape; flagellar joints twice as long as wide.

Mesonotum deeply trilobed; median lobe strongly extended forward; notauli deeply impressed, straight, in part indistinctly crenulate, rapidly converging to hind margin, flanking a narrow, median basal area, which is provided with a lanceolate median groove having several indistinct cross rugae; scutellum anteriorly bifoveate, foveæ rather long and narrow, median carina low and weak, and each fovea subdivided behind by a weak, rudimentary, median carina; posterior disk of scutellum smooth and shining. Postscutellum bifoveate medially, each fovea opening anterolaterally. Metanotum irregularly, sparsely rugose, a rudimentary median carina at base; median area with distinct outlines of a large, broad, lozenge-shaped area, which is rugose within and with an irregular, narrow, sharp-rimmed median furrow; from either angle of the lozenge-shaped median area a transverse carina passing to near the midlateral blunt prominence; spiracle large and elliptical, an irregular longitudinal carina passing beneath it; metapleura smooth anteriorly, indistinctly roughened posteriorly; mesopleura smooth and shining, disk with a broad, gradually depressed groove, which is medially obscurely crenulate.

Abdomen a little longer than head and thorax together, sessile, with six exposed tergites, gradually broadened to third segment; first segment suddenly narrowed near base, basal width about one third the apical, length one and one-third times the apical width; second tergite a little shorter than first, apical width a little greater than length; third to sixth tergites subequal in length and two thirds length of second, beyond third rapidly narrower, sixth truncate apically; all tergites longitudinally, shallowly striate, with interstriae shagreening, apically more finely so, striae not reaching hind margins of fourth, fifth, and sixth segments; striae somewhat oblique on lateral portions of third, fourth, and fifth tergites; first and second tergites with a distinct median carina; second suture strongly curved, impressed, and crenulate; fifth and sixth segments broadly depressed at base; hypopygium short but deep.

Stigma long and narrow, about five times as long as broad;

radius inserted at the proximal two fifths; first abscissæ of radius about half length of second; second cubital cell about twice as long as wide; first transverse cubital oblique; second vertical and decolored; cubitus becoming obsolete shortly beyond second cubital cell; recurrent vein joining cubitus a short distance before first transverse cubitus, intervening vein decolored; parallel vein inserted at lower third, but appearing interstitial by reason of the posterior vein being obsolete beyond second cubital cell; transverse median vein interstitial with basal; radial vein in hind wing at one third of its length, strongly and suddenly curved toward costa, beyond this obsolete; nervellus oblique, slightly curved on upper half.

Luzon, Laguna, Los Baños (coll. Baker).

Rhogasella lineata sp. nov.

Antennæ and abdomen pale sordid ferruginous; flagellar sutures darkened; legs and tegulae stramineous. A more or less distinct and in part subcontinuous, narrow, discal, piceous stripe on metanotum and abdominal dorsum. Interocellar area piceous. Palpi entirely decolored. Wings very slightly obscured, costa ochraceous, stigma stramineous, veins darkened. Ovipositor ochraceous, as long as depth of last exposed segment and hypopygidium together.

Female, length, 5 millimeters.

Head viewed from above with large nonbulging eyes, which deeply enter head; vertex very rapidly narrowing back of eyes, occipital margin very narrow; length of exposed cheek margin not twice distance of ocelli to eyes and less than distance from ocelli to occipital margin (which is nearly straight); entire surface of vertex, including area in front of ocelli, smooth and shining; ocelli small, distance from eyes a little more than half distance from occipital margin; anterior ocellus a half again as far from posterior ocelli as these are from each other, the latter nearer to each other than their long diameter and a little farther from eyes than their long diameter. Face subquadrate; broader than long; subobsoletely, transversely, and irregularly punctulate-striate; medially umbo-carinately raised just below antennæ; mouth opening narrow, subelliptical; clypeus transverse, basal and apical margin broadly curved and subparallel; clypeal pits distant from eyes about four times their diameter. Head viewed from side with face very strongly projecting, especially at antennæ, but very slightly curved at middle; cheek narrow, about one fourth the lower width of eye, outer margin parallel to eye margin; malar space long, twice the lower width

of cheek; eye large, its outline very broad and bluntly elliptical, but narrower on the lower half. Maxillary palpi slender, terete, third and fourth joints long, subequal in length and longer than fifth and sixth together. Antennæ longer than entire body, scape slender, little narrower at base, twice as long as wide; funicle narrower than scape and half as long; flagellar joints twice as long as wide.

Mesonotum deeply trilobed; median lobe strongly extended forward; notauli deeply impressed, straight, in part indistinctly crenulate, rapidly converging to hind margin, flanking a narrow median basal area, which is provided with a lanceolate median groove having several indistinct cross rugæ. Scutellum anteriorly bifoveate, foveæ rather long and narrow, median carina low and weak, and each fovea subdivided behind by a weak rudimentary median carina; posterior disk of scutellum oval, smooth, and shining. Postscutellum bifoveate medially, each fovea open anterolaterally. Metanotum irregularly rugose and with a rudimentary median carina at base; median area with partial outline of a large lozenge-shaped area, rugose within, but broken by three stout transverse rugæ; midlateral area with a blunt prominence; spiracle large, elliptical; a weak, irregular, longitudinal carina passing beneath spiracle; metapleura nearly smooth anteriorly, indistinctly roughened posteriorly; mesopleura smooth and shining, disk with a broad, gradually impressed groove on posterior two thirds, which is medially, obscurely crenulate.

Abdomen a little longer than head and thorax together, sessile, with six exposed segments, gradually broadened to third segment; first segment suddenly narrowed near base, basal width one third the apical, length subequal to apical width; second tergite subequal in length to first, apical width much greater than length; third to sixth tergites subequal in length and two thirds length of second, beyond third rapidly narrower, sixth truncate apically; all tergites longitudinally, finely, shallowly striate, with interstrial shagreening, striae not reaching hind margins of fourth, fifth, and sixth segments; striae somewhat oblique on lateral portions of third, fourth, and fifth tergites; only the first tergite with a distinct median carina; second suture connate, strongly curved, impressed, and crenulate; fifth and sixth segments broadly depressed at base. Hypopygium short and deep.

Stigma long and narrow, about five times as long as broad, radius inserted near the middle; first abscissa of radius about

half length of second; second cubital cell about twice as long as wide, first transverse cubital oblique, second vertical and decolored; cubital vein becoming obsolete shortly beyond second cubital cell; recurrent vein joining cubitus a short distance before first transverse cubitus, intervening vein decolored; parallel vein inserted at lower third, but appearing interstitial by reason of the posterior vein being entirely obsolete beyond second discoidal cell; transverse median vein interstitial with basal; radial vein in hind wing at one third of its length strongly and suddenly curved toward costa, beyond this obsolete; nervellus oblique, slightly curved on upper half.

Luzon, Laguna, Los Baños (coll. Baker).

Genus RHOGAS Nees

The numerous Philippine species of this well-known genus will be described in a subsequent paper.

Genus PSEUDOGYRONEURON novum

Eyes very large; malar space long, due to a strong narrowing of mouth. Vertex back of ocelli of medium length. Antennae longer than entire body, scape short and swollen, funicle broad and three fourths length of scape, flagellar joints more than twice as long as wide. Maxillary palpi of great size, reaching to end of metanotum, third to sixth joints strongly modified, third swollen, fourth, fifth, and sixth flattened. Labial palpi with third joint elongate and flattened.

Scutellum quadrifoveate anteriorly. Metanotum with a narrow, lanceolate, high-rimmed median area and with strong, blunt prominences on the posterior lateral areas; spiracles small and round. Disk of mesopleura with a short, oblique, noncrenulate furrow.

Radial cell reaching apex of wing. Radial vein inserted at basal two fifths of the length of the long, rather narrow, stigma. Thickened first abscissa of radius about half length of second; second cubital cell nearly twice as long as broad, not narrowed apically, both transverse cubiti more or less oblique. Recurrent vein inserted a short distance from apex of first cubital cell. Submedian cell a little longer than median. Parallel vein inserted at lower third. Radius of hind wings curved toward costa. Type, *Pseudogyroneuron mindanaensis* sp. nov.

Pseudogyroneuron mindanaensis sp. nov.

Stramineous, with piceous shading on lateral lobes of mesonotum anteriorly, on anterior portions of mesopleura, on pros-

ternum, on anterior portion of metanotum, and on scape and funicle; flagella piceous; interocellar area black. Wings faintly smoky, veins testaceous; media, basal, and first abscissa of radius darker; stigma pale, decolored anteriorly.

Female, length, about 5.5 millimeters.

Head viewed from above transverse, not rapidly narrowing behind, eyes strongly bulging beyond head outline; exposed cheek margin a little shorter than length of vertex back of ocelli; occipital carina subangulately bent; length of exposed cheek margin one third greater than distance from ocelli to eyes, interocellar distance less than the diameter of the large and strongly prominent ocelli and equaling about half the distance from ocelli to eyes; vertex back of ocelli smooth and shining; surface in front of anterior ocelli radiately wrinkled and not depressed.

Face very short, broader than long and broader below than above, medially slightly raised, smooth, with a few subobsolete punctures. Mouth opening very narrow. Clypeus transverse, smooth, upper and lower margins subparallel, the latter rather strongly impressed. Mandibles with outer surface roughened. Head viewed from side with face evenly curved; malar space very long, due to narrowing of mouth, its length somewhat greater than width of cheek below; cheek about one third of width of lower half of eyes, cheek margin subparallel to eye margin; eye very broad, subelliptical, and a little broader on lower half.

Maxillary palpi of great size, extending to end of metanotum; third to sixth joints strongly inflated; third as broad apically as posterior femora and slightly longer than depth of eye, subterete, strongly narrowed to base, slightly flattened toward lower edge; fourth as long as third, nearly as wide basally as third at apex, then narrowed apically; fifth, three fourths length of fourth and much narrowed, as broad apically as basally; sixth, two thirds length of fifth, much narrower and spindle-shaped in outline; fourth, fifth, and sixth segments much flattened; labial palpi reaching tegulae, fourth joint elongate and flattened.

Mesonotum trilobed, shining, slightly roughened, notauli deeply impressed anteriorly, broad and irregularly crenulate posteriorly, where they rather suddenly converge to a narrow, impressed, median basal groove. Scutellum anteriorly quadrifoveate, the separating carinae low; posterior disk of scutellum strongly convex and smooth. Postscutellum very shallowly bifoveate. Metanotum very coarsely, irregularly rugose; a strongly rimmed, narrowly lanceolate, median area with irregular

margins broken at several points by rugae; posterior lateral areas with strong, blunt prominences from which radiate rugae; spiracle small and round; lateral carina complete, though irregular; metapleura smooth with a somewhat rugose median ridge posteriorly; mesopleura smooth and with a short, sharply impressed, oblique, noncrenulate discal furrow.

Abdomen longer than head and thorax together, sessile, broad, gradually widened to third segment; first segment but little wider at apex than at base, length about one and one-half times width at apex; second about as long as first but wider, gradually widening apically, length and apical width subequal; third much shorter than second and twice as wide as long; fourth, fifth, and sixth subequal in length, slightly shorter than third, and successively narrower; seventh segment very short, its hind margin slightly incurved, the subangulate point of eighth a little exposed; all tergites coarsely, sharply, longitudinally striate, minutely reticulate-punctate between the striae; sculpturing on sixth segment distinct only at base; median carina distinct only on first two tergites; first suture impressed only at middle; second suture narrowly and slightly impressed; third, fourth, and fifth sutures deeply impressed and strongly crenulate. Hind tibiae with two straight, hairy spurs, which are about as long as fourth tarsal joint.

Stigma long, rather narrow, about five times as long as wide, widest and obtusely angled at two fifths of length from base where radius is inserted; thickened first abscissa of radius about half length of second; second cubital cell nearly twice as long as wide, not narrowed apically; first transverse cubitus strongly oblique, second slightly so and decolored; first recurrent vein nearly straight, entering first cubital cell a short distance before apex; the parallel vein inserted at lower third; submedian cell a little longer than median. Radius of hind wings curved toward costa.

MINDANAO, Butuan (coll. Baker).

Genus **PARAGYRONEURON** novum

Eyes of medium size, malar space long, cheeks broad. Antennæ as long as body, scape large, one and one-half times as long as broad, funicle much narrower and not half as long; length of flagellar joints one and one-half times the width. Maxillary palpi normal, short and slender.

Scutellum bifoveate anteriorly, metanotum medially carinate on anterior half, a median lanceolate area on posterior half, surface very coarsely rugose and two strong prominences on

midlateral areas, which are extended into stout teeth; spiracle large and broadly elliptical. Mesopleura with a very large, deep, crenulated discal furrow on posterior half.

Radial cell reaching apex of wing. Radius inserted at basal two fifths of the large, long stigma. First abscissa of radius more than half length of second; second cubital cell not twice as long as wide, not narrower apically, and with both transverse cubiti oblique. Recurrent vein inserted near apex of first cubital cell. Submedian cell longer than median. Parallel vein inserted at lower fifth. Radius of hind wings curved toward costal; nervellus curved and bent at middle.

Abdomen broadly sessile, a little shorter than head and thorax together; first abdominal tergite very broad, length equaling apical width; remaining segments much broader than long; first and second tergites medially carinate. Hind tibial spurs stout, curved, and hairy.

Type *Paragyroneuron bicolor* sp. nov.

Paragyroneuron bicolor sp. nov.

Ochraceous; flagella black; hind tarsi and stigma piceous; scape and funicle obscure ferruginous. Wings basally with veins ochraceous; on and beyond basal vein smoky, veins dark, a piceous cloud along basal vein.

Female, length, 10 millimeters.

Head viewed from above with eyes suboval and very strongly bulging, vertex caudad of eyes smooth, gradually narrowed, very long, occipital carina very strongly raised; ocelli small, transparent, much nearer to each other than to eyes and twice as far from occipital carina as from eyes. Face long, narrower at lower margins of eyes, gently arched, surface smooth; eyes in front view kidney-shaped, strongly emarginate opposite antennæ. Head as viewed from side with malar space long; cheeks very broad, as broad as eyes, margin parallel to outer margin of eyes; eye outline semicircular.

Mesonotum smooth, notauli smooth, but anteriorly profoundly excavated; scutellum anteriorly with two large, suboval, smooth, deep foveæ, separated by a sharp median carina. Metanotum with coarse, wavy rugæ, becoming finely reticulate-rugose near anterior border, with a sinuous median carina splitting on posterior half, forming a lanceolate, wavy-margined, median area; rugæ separate, leaving smooth areas between the lanceolate median area and the large lateral teeth; numerous short rugæ radiately arranged about the base of each tooth; teeth large and bluntly tipped; spiracle broadly elliptical. Mesopleura

smooth, sparsely, shallowly punctate; with an oblique shallow furrow crossed by numerous short rugae.

Abdomen very broad, broadly sessile; fourth and fifth segments slightly swollen; the second to fourth sutures broad, somewhat strongly constricted and crenulate; first segment about as broad as long and slightly narrower at base; second segment subquadrate, a little longer than first and a little broader than long; first and second segments coarsely, longitudinally rugose, medially carinate, and with a strong submedian carina, which on first segment at base becomes a ridge; third to fifth tergites more finely sculptured, becoming punctate-rugose. Hind tibial spurs very short, subequal, not as long as third tarsal joint; first tarsal joint slightly longer than next three together; second as long as third and fourth together.

Stigma very large, about three times as long as broad, lower margin evenly curved; radius inserted near middle; first abscissa of radius slightly more than half length of second; second cubital cell subtrapezoidal, less than twice as long as wide, both transverse cubitals oblique; recurrent vein inserted near apex of first cubital cell; parallel vein inserted far below, near to posterior vein. In hind wings, nervellus subangulately bent at middle.

Luzon, Benguet, Baguio (coll. Baker).

Gehus GYRONEURONELLA novum

Eyes very large, malar space and cheeks relatively small. Ocelli of medium size. Vertex back of ocelli long. Antennæ longer than entire body. Maxillary palpi normal.

Head and mesonotum nearly smooth. Notauli distinct on disk of mesonotum; scutellum anteriorly bifoveate; postscutellum short and minutely bifoveate; metanotum without lateral prominences and medially with a lanceolate area; spiracles narrowly elliptical.

Radial cell reaching apex of wing. Radial vein inserted at two fifths length from base of the broad stigma. First abscissa of radius more than half length of second; second cubital cell twice as long as wide, abruptly narrowed at apex. Recurrent vein inserted some distance before apex of first cubital cell; submedian cell much longer than median and with the transverse median vein strongly curved and enlarged. Median vein normal. Parallel vein straight at insertion.

Abdomen longer than head and thorax together; terminal segments not retracted.

Type, *Gyroneuronella kokujewii* sp. nov.

Gyreusurinella kokujewii sp. nov.

Ochraceous, paler on lower part of head, pronotum, sternum, and basal segments of abdomen and darker on abdominal dorsum. Interocellar area black. Antennæ darker distally, to piceous at tips. Wings slightly suffused with smoky across middle third; veins ochraceous, except the dark stigma, basal vein, first abscissa of radius, and other veins across middle third of wing.

Female, length of body, 4.5 millimeters; of ovipositor, 1.

Head viewed from above with eyes large, but not strongly bulging; vertex back of ocelli long, occipital carina strongly but regularly incurved, length of exposed cheek margin twice distance from eye to ocelli and distinctly less than distance from ocelli to occipital margin; surface of vertex smooth and shining, with a distinct median impressed line from ocelli to occipital margin; ocelli of medium size, distance between them slightly less than distance from ocelli to eyes, the latter distance subequal to diameter of an ocellus, distance to occipital margin about the diameter of an ocellus; surface in front of anterior ocellus smooth. Face subquadrangular, a little longer than wide, above broadened somewhat toward emargination of eyes; surface obscurely roughened and gently arched; mouth opening small and narrow, lower margin of clypeus nearly straight. Head viewed from side with face rather strongly prominent below antennæ; cheeks narrow, barely one fourth width of eye, slightly narrowed above; malar space very small, length distinctly less than width of cheeks below; eye very large, its outline very broadly subelliptical.

Mesonotum smooth, shining; notauli shallow and coarsely crenulate, but little impressed anteriorly, posteriorly reaching hind margin at sides of the broad, rugose, median depressed area. Scutellum anteriorly with two very large, smooth foveæ, with a strong, median, separating carina; posterior disk of scutellum as long as broad at base, very gradually narrowed to the rounded apex. Metanotum with a narrow, percurrent, sharp, but irregular, margined, median area, which is acute anteriorly and parallel-sided posteriorly; each lateral area with several more or less distinct longitudinal rugæ converging toward petiolar margin; an irregular, sinuous, partially crenulate, longitudinal furrow below the narrowly elliptical spiracle; metapleura and mesopleura shining, the latter with a short, deep, oblique, discal furrow.

Abdomen a little longer than head and thorax together, sub-

sessile, and gradually widening to third segment; first segment three times wider apically than basally, length but slightly greater than apical width; second segment very slightly wider at apex than at base, its length subequal to that of first, and a little more than half apical width; third to sixth segments short, transverse, two thirds to three fourths length of second, somewhat swollen, and progressively narrower; all tergites somewhat irregularly but evenly, longitudinally striate, except toward apex of sixth segment; first and second tergites with distinct median carinae; first suture slightly impressed at middle, second to fifth sutures rather deeply constricted and crenulate. Hind tibiae with two straight, equal spurs, which are about as long as fourth tarsal joint; first hind tarsal joint subequal in length to next two together.

Stigma large and wide, about four times as long as wide, subangulate at two fifths of length from base where radius is inserted; first abscissa of radius distinctly more than half length of second; second cubital cell about twice as long as high, narrowed at apex, first transverse cubitus very oblique, second vertical and white; recurrent vein joining cubitus a distance of more than half the length of first transverse cubitus from apex of first cubital cell, intervening vein decolored; parallel vein inserted at middle; submedian cell much longer than median, strongly rounded apically, the curved transverse median vein as well as adjoining portions of median and posterior veins, greatly enlarged.

Luzon, Laguna, Los Baños (coll. Baker).

Named for Mr. N. R. Kokujew, a well-known Russian student of the Ichneumonoidea.

Genus *HEMIGYRONEURON* novum

Eyes very large, malar space and cheeks relatively small. Ocelli very large, subapproximate to eyes. Vertex back of ocelli very short. Antennae shorter than body. Maxillary palpi normal.

Head and mesonotum coarsely sculptured; notaui obsolete on disk of mesonotum; scutellum anteriorly multifoveate; postscutellum large and mutifoveate. Metanotum without lateral prominences and medially carinate, spiracles round, oval, or broadly elliptical.

Radial cell reaching apex of wing. Radial vein inserted at two fifths length from base of the broad stigma. First abscissa of radius half length of second or less; second cubital cell twice as long as wide or less, not abruptly narrowed at apex. Recurrent

vein inserted very near apex of first cubital cell or at some distance from it; submedian cell much longer than median and with the transverse median vein strongly curved and enlarged, together with postmedian and apical third of median, the last angulated at juncture with normal portion of median. Parallel vein strongly curved at insertion.

Abdomen not or very little longer than head and prothorax together, terminal segments more or less retracted.

Type, *Hemigyroneuron speciosus* sp. nov.

Synopsis of the species.

- a'. Notauli entirely obsolete; posteromedian mesonotal area without longitudinal groove; face carinate on upper half; body extensively ornamented with black; antennae banded *speciosus* sp. nov.
a". Notauli distinct only on anterior border of mesonotum; posteromedian mesonotal area with a deep, strongly rimmed, longitudinal groove; face carinate on lower half; body without black, except between ocelli; antennae not banded *suffusus* sp. nov.

Hemigyroneuron speciosus sp. nov.

Ochraceous, extensively ornamented with black. Antennae piceous, middle third stramineous, apical third paler than basal; clypeus and entire vertex black. Thorax black as follows: A spot on propleura, lateral area of mesonotum, middle area extending back in a sharp point on basal two thirds, scutellum, sides of postscutellum, entire metanotum, upper anterior angle and lower half of mesopleura, and mesosternum. Hind coxae, except tips, piceous. Abdomen with a transverse black band on middle third of first tergite, basal halves of remaining segments black; third and following segments apically sordid stramineous. Fore and middle legs, except coxae, pale ferruginous, coxae stramineous; hind femora ferruginous, their trochanters, basal two thirds of tibiae, and tarsi stramineous; apical third of hind tibiae piceous. Wings iridescent and faintly smoky, costa and stigma ochraceous, veins dark smoky, those on basal half of wing much darker.

Male, length, 9 millimeters.

Head viewed from above, narrowly transverse, eyes very large and extending far into vertex; vertex caudad of ocelli very short, occipital carina deeply, but very broadly, incurved; length of exposed cheek margin many times the distance from eye to ocelli and distinctly more than distance from ocelli to occipital margin; surface of vertex rugose-shagreened; ocelli of great size, the two posterior set in impressed, rimmed pits, the anterior slightly raised and strongly directed forward; ocelli very close to each

other and to eyes, the latter distance being about one fourth the distance from ocelli to occipital carina, the last distance being less than the diameter of an ocellus; surface in front of anterior ocellus shagreened.

Face longer than wide, broader above than below on account of the deeply emarginated eyes; surface not strongly raised, entirely, transversely rugose and with a low median carina on upper half; clypeus very large, but narrow, strongly semilunate, its surface reticulate-rugose; mouth opening subcircular; outer surface of mandibles longitudinally rugose to near apices. Head viewed from side with face a little prominent below antennæ; cheek narrow, barely one fourth width of eyes, cheek margin parallel to eye margin; length of malar space greater than width of cheek; both malar space and cheek finely rugose; eye outline irregularly subelliptical, broader at lower half, lower end more narrowly rounded than upper.

Mesonotum full and broadly arched, finely rugose-shagreened, slightly depressed lines marking position of notauli anteriorly; posteromedian depressed area shallow, elongate, and finely rugose. Scutellum anteriorly with six small, subequal foveæ, separated by equally strong longitudinal carinæ; posterior disk of scutellum subtriangular, bluntly pointed, surface finely rugose-shagreened; postscutellum large, sexfoveate, foveæ separated by equally strong longitudinal carinæ, two central foveæ twice as broad as lateral foveæ. Metanotum entirely coarsely reticulate-rugose and shagreened, and with a sharp median carina on basal half; spiracle large, broadly elliptical, standing above a sharp, sinuate, longitudinal carina, this carina flanking, just below, a narrow crenulate furrow; metapleura discally, concentrically, finely rugose, upper anterior angle reticulate-rugose and shagreened; mesopleura with disk not furrowed, but concentrically, finely rugose, upper anterior angle coarsely reticulate-rugose.

Abdomen slightly longer than head and thorax together, broadly sessile, gradually widening to third segment, remaining segments rapidly narrower and together not longer than third segment; first segment two thirds as broad basally as apically, length one and one-third times the apical breadth; second segment gradually broadened apically, length less than apical width and three fourths the length of first segment; third segment a little broader and three fourths the length of second, the length subequal to one half width; remaining segments all very short, fifth longest, all smooth and shining; first and second tergites and base of third tergite finely longitudinally rugose and medially carinate, rugæ on third tergite posteriorly oblique, curving

away from median line; first suture slightly impressed; second suture narrowly, but more deeply, impressed and crenulate. Hind tibiae with two large, stout, straight spurs, the inner the longer, this spur as long as second tarsal joint.

Stigma large and wide, about four times as long as wide; subangulate at two fifths of length from base, where radius is inserted; first abscissa of radius distinctly more than half length of second; second cubital cell twice as long as high, not at all narrowed to apex, first transverse cubital very oblique, second vertical and decolored; recurrent vein joining cubitus a distance before second cubital cell of half length of first cubital cell, intervening vein decolored; parallel vein inserted at lower third and strongly curved just before insertion; submedian cell much longer than median, subangularly rounded at apex; the straight transverse median vein, the postmedian, and apical third of median vein enlarged, the median being angularly bent at beginning of normal portion.

Luzon, Laguna, Mount Banahao (coll. Baker).

Hemigyroneuron suffusus sp. nov.

Ferruginous, antennæ darkened toward tips, legs slightly paler. Intercellular space piceous. Wings suffused with pale ochraceous, veins ochraceous; stigma entirely concolorous; apex of basal vein, basal curved part of parallel vein, and adjoining portion of recurrent piceous.

Male, length, 7 millimeters.

Head viewed from above rather broadly transverse, eyes very large and strongly bulging; vertex caudad of ocelli very short and rapidly narrowed caudad, occipital carina deeply but evenly incurved; length of exposed cheek margin twice the distance from ocelli to eyes or from ocelli to occipital margin, the last two distances being subequal; surface of vertex shallowly rugose; ocelli of great size, set on a slight eminence, separated by less than half their diameter, which is about twice the distance to eyes or to occipital carina; surface in front of anterior ocellus smoothly excavated.

Face longer than wide, rapidly broadened above to the deep emargination of eyes; surface irregularly, transversely rugose, raised at middle, thence to clypeal border, medially, sharply carinate; clypeus with a narrow, rimmed depression on either side, which gradually broadens toward anterior margin; basal suture of clypeus very strongly, narrowly arched and impressed; surface of clypeus rugose; mouth opening small, narrow, subcircular; outer surface of mandibles minutely, longitudinally striate

to near apices. Head viewed from side with face margin evenly and gently curved below antennæ, but with clypeus abruptly elevated; cheeks narrow, below scarcely one fifth the width of eye, broader above; length of malar space one and one-half times width of cheek, transversely rugose; eye much broader on lower half.

Mesonotum full and broadly arched, thickly and finely rugose, with a suggestion of shagreening, but slightly impressed on anterior margin at notaüli; notaüli faintly indicated by coarser rugæ; posteromedian area occupied by a broad, sharp-rimmed furrow, which is cross-striate within. Scutellum anteriorly with six small foveæ (the outer broader), separated by equally strong longitudinal carinæ; posterior disk of scutellum finely rugose and oval, the point obliquely flattened and smoother; postscutellum large, two large deep foveæ at middle, two others on each side much shallower, all separated by longitudinal carinæ. Metanotum coarsely reticulate-rugose, with a sharp, complete, median carina which is posteriorly sinuous; two large, submarginal, irregular foveæ near posterolateral angles on either side; spiracle oval, a strong, continuous, longitudinal, lateral carina passing immediately below it; metapleura coarsely rugose, a small area at center smooth, two small, sharply rimmed areæ at anterior angle; mesopleura with anterior third coarsely rugose, remainder nearly smooth and with large, scattering punctures, beneath wing with a broad vertical depressed area, which is strongly rimmed on anterior border.

Abdomen nearly as long as head and thorax together, broadly sessile, gradually broadening to third segment; remaining segments rapidly narrowed and retracted, so that only their borders are exposed, together about as long as third segment; first segment four fifths as wide basally as apically, length slightly more than apical breadth; second segment slightly broadened to apex, subequal to first in length, its width and length subequal; third segment slightly broader than second and three fourths its length, its length less than half its apical width; first and second tergites and basal three fourths of third coarsely, longitudinally rugose, with a strong, continuous, median carina reaching on to basal half of third tergite; remaining tergites smooth, shining, and decolored; first suture strongly, sharply depressed, second less so and weakly crenulate. Hind tibiae with two stout, straight spurs, the inner longer, about as long as third tarsal joint.

Stigma large, wide, about four times as long as wide, widest at two fifths of length from base, where radius is inserted;

first abscissa of radius less than half the length of second; second cubital cell more than twice as long as wide, distinctly narrowed toward apex; first transverse cubital very oblique, decolored, and a little curved; second vertical and colored; recurrent curved and joining cubitus a very short distance from apex of first cubital cell, intervening vein not decolored; parallel vein inserted at lower two fifths and strongly curved just before insertion; submedian cell much longer than median, strongly rounded at apex; curved transverse median, curved postmedian, and apical third of median greatly enlarged, the median being angularly bent at beginning of normal portion.

MINDANAO, Davao (coll. Baker).

NITIDULIDÆ (COLEOPTÈRES) DES ILES PHILIPPINES
RÉCOLTÉS PAR C. F. BAKER, II

Par A. GAOUVELLE

(Paris, France)

Brachypeplus (Selis) decoratus sp. nov.

Ovatus, circiter ter longior quam in maxima latitudine latior, modicissime convexus, nitidulus, capite prothoraceque glaber, abdomine tenuissime flavo-pubescentia rufo-testaceus; antennarum clava capiteque infuscatis; prothoracis margine basili medio, scutello elytrorum marginibus suturalibus anguste, lateralibus satis late, apicalibus late nigris; abdominis tribus ultimis segmentis disco subnigris vel fortiter infuscatis. Caput transversissimum convexiusculum crebre punctatum; epistomo subquadrato, convexo, antice truncato, postice a fronte sulco arcuato, vix integro, separato; oculis mediocriter productis, oris internis antice fortiter convergentibus. Prothorax convexiusculus, antice quam postice magis angustatus, lateribus arcuatus, in maxima latitudine plus duplo latior quam longior, crebre et capite paulo minus valide punctatus; margine antice truncato; angulis anticis rotundatis; marginibus lateralibus anguste marginatis; angulis posticis obtusis; basi truncata quam lateribus magis tenuiter marginata. Scutellum semiorbiculatum, crebre punctulatum. Elytra parallela, simul latiora quam longiora, apice latissime separatim arcuata, lineato-punctulata, linearum intervallis satis tenuiter bilineato-punctatis; marginibus lateralibus praecipue ad apicem anguste marginatis. Abdominis segmenta crebre punctulata; ultimo apice subinfuso, obtuse acuminato.

Longueur, 5.5 millimètres.

Ovale, atténué vers l'extrémité de l'abdomen, environ trois fois plus long que large dans sa plus grande largeur, médiocrement convexe, assez brillant, glabre sur la tête et le prothorax, couvert sur l'abdomen d'une pubescence flave, très fine et très courte; roux testacé; tête et massue des antennes enfumées; milieu de la marge basilaire du pronotum, écuison, marges suturales des élytres étroitement, marges latérales largement, marges apicales encore plus largement noires; disque des segments abdominaux plus ou moins noirâtres. Antennes courtes; 1^{er} article

arqué, dilaté en-dedans; massue à peine plus longue que large; articles serrés, le dernier plus étroit que le précédent, terminé par un bouton acuminé; 8^{me} article de l'antenne très transversal, amorçant la massue. Tête légèrement convexe, deux fois plus large au niveau des yeux que longue, très densément et finement ponctuée sur le front, très finement sur l'épistome; celui-ci assez convexe, saillant, en forme de rectangle, s'avancant au milieu de la marge antérieure, en avant des bases des antennes, séparé du front par une impression arquée, s'étendant entre les bases des antennes, très marquée vers celles-ci, effacée au milieu. Yeux peu saillants, allongés, leurs bords internes très convergents; angles postérieurs aigus; tempes très petites, labre bien visible. Prothorax assez convexe, plus rétréci en avant qu'à la base, arqué sur les côtés, présentant sa plus grande largeur vers le premier tiers de la longueur à partir de la base, très nettement plus de deux fois plus large dans cette plus grande largeur que long, couvert d'une ponctuation un peu plus forte que celle de la tête, très serrée, subrugueuse vers les côtés. Bord antérieur subtronqué; angles antérieurs arrondis; côtés bordés par un fin bourrelet s'étendant sur l'angle antérieur et par une cannelure étroite; angles postérieurs obtus; base tronquée, bordée plus étroitement que les côtés. Ecusson presque demi circulaire, très densément et finement pointillé. Elytres subtronqués à la base, brièvement arrondis aux épaules, parallèles, largement arrondis aux angles apicaux externes, très largement et séparément arqués au sommet, environ une fois et un sixième plus larges ensemble que longs, assez finement striés-pointillés; intervalles des stries présentant chacun deux lignes de points plus forts que ceux des stries. Marges latérales pliées, infléchies, bordées par un fin bourrelet, se continuant en s'atténuant sur la marge apicale et par une cannelure assez marquée à la base, élargie vers le milieu de la longueur, atténuée vers le sommet. Segments de l'abdomen très densément pointillés; le dernier terminé en angle très obtus. Dessous roux testacé; sternites impressionnés sur les côtés; dernier subtronqué à l'extrémité. Sillons antennaires très convergents.

Luzon, Benguet, Baguio (Baker), 1 exemplaire mâle, collection A. Grouvelle.

Brachypeplus denticeps sp. nov.

Oblongus, circiter quater longior quam in maxima latitudine latior, mediocriter convexus, opacus, subtilissime flavocinereopubescens, ater; antennis pedibusque plus minusve dilute rufopiceis; prothoracis marginibus lateralibus anguste rufescentibus.

Caput transversissimum, fronte sub depresso et crebre punctatum; punctis sat validis, haud profundis; epistomo antice truncato, utrinque sinuato vix punctulato, transversim subconvexo, basi utrinque impresso; oculis modice productis, oris internis antice sat fortiter convergentibus; angulis posticis fortiter acuto-productis. Prothorax transversim convexiusculus, antice angustatus, basi subparallelus, plus duplo latior quam longior, crebre punctatus; punctis sat validis, tenuiter impressis, ex parte confluentibus; margine antico truncato, anguste pulvinato marginato; angulis anticis rotundatis; marginibus lateralibus sublate concavo-explanatis; angulis posticis breviter rotundatis; basi striato-marginata, medio truncata, extremitatibus retrorsum vix inflexa. Scutellum transversissimum, subpentagonale, parallelum, convexiusculum, tenuissime punctulatum. Elytra subparallelia, apicem versus vix perspicue ampliata, angulis posticis rotundata, apice separatim vix arcuata, paulo longiora quam simul latiora, lineato punctata; intervallis linearum angustis, subasperis, vix perspicue striatis. Abdominis ultimum segmentum vix longior quam latior, transversim subconvexum, lateribus sublate marginatum.

Longueur, 4 millimètres.

Oblong, environ quatre fois plus long que large dans sa plus grande largeur, médiocrement convexe, presqu'opaque, très faiblement pubescent, noir; antennes, sauf la massue et le premier article qui sont plus foncés, roux de poix; pattes plus ou moins brun de poix, tarses plus clairs, marges latérales du prothorax rougeâtres. Antennes courtes; 1^{er} article transversal, fortement dilaté arrondi en dedans; massue à peine plus longue que large, articles serrés, le dernier plus étroit que le précédent, terminé par un bouton acuminé. Tête subdéprimée, plus de deux fois plus large au niveau des yeux que longue, couverte sur le front d'une ponctuation assez grosse, superficielle, très serrée, lui donnant un aspect un peu rugueux; épistome tronqué en avant, sinué de chaque côté jusqu'à la base de l'antenne, transversalement subconvexe, à peine ponctué, assez fortement impressionné de chaque côté de la base, vers la naissance de l'antenne; angles postérieurs de la tête très aigus et très saillants; yeux peu saillants, allongés, leurs bords internes convergents. Base de la tête tronquée, un peu saillante, en arrière, aux extrémités, en forme de lobe arrondi. Prothorax transversalement subconvexe, rétréci en avant, parallèle dans sa partie basilaire, très nettement plus de deux fois plus large vers la base que long, couvert d'une ponctuation semblable à celle de la tête mais plus forte. Bord antérieur tronqué, bordé par un étroit bourrelet plus accen-

tué vers les extrémités; angles antérieurs arrondis, marges latérales assez largement explanées-concaves, s'étendant sur les angles antérieurs et postérieurs; ceux-ci émoussés; base striée-rebordée, tronquée, légèrement infléchie en arrière aux extrémités. Ecusson plus de deux fois plus large à la base que long, parallèle, en angle largement obtus au sommet, légèrement convexe, très finement pointillé. Elytres légèrement arqués à la base, brièvement arrondis aux épaules, droites sur les côtés, à peine élargis vers le sommet, fortement arrondis aux angles apicaux externes, séparément et très faiblement arrondis au sommet, environ une fois et un cinquième plus longs que larges ensemble vers le sommet, assez fortement ponctués en lignes infléchies en dedans; intervalles des stries très finement chagrinés, à peine visiblement striés, points des lignes ponctués-serrés, assez profonds, atteignant presque le sommet. Marges latérales infléchies plus fortement sur les régions humérales et apicales, bordées par un fin bourrelet, qui se prolonge, sur les marges apicales des élytres, en restant légèrement au-dessous de leur surface. Segments de l'abdomen densément ponctués; dernier segment à peine plus long que large, largement émoussé à l'extrémité, bordé de chaque côté par une carène peu accentuée. Dessous brun de poix, un peu brillant, très finement pointillé; segments 3 et 4 étroitement bordés de flave au sommet, 2, 3 et 4 impressionnés de chaque côté.

Luzon, Tayabas, Malinao (Baker), 1 exemplaire femelle, collection A. Grouvelle.

Voisin comme aspect général de *B. hispidulus* Grouv.

Brachypeplus marginellus sp. nov.

Oblongo-elongatus, plus quater longior quam in maxima latitudine latior, modicissime convexus, nitidus, glaber, rufulus; capite, elytrorum apice et marginibus reflexis plus minusve sub-infuscatis. Caput transversum, fronte convexiusculum et dense punctulatum; epistomo ante antennarum bases anguloso-producto, apice hebetato, subtiliter punctulato; oculis mediocriter productis, oris internis subrectis, antrorsum mediocriter convergentibus; temporibus minutis, angulis posticis acutis. Prothorax transversim convexus, antice quam postice vix angustatus, lateribus modice arcuatus, circiter in maxima latitudine sesquiatior quam longior, quam caput validius punctatus, punctis ad latera attenuatis; margine antico vix perspicue sinuato; extremitatibus breviter retorsum inflexo; angulis anticis modice obtusis; marginibus latéralibus canaliculo et pulvino angustis marginatis; angulis posticis vix obtusis; basi subtruncata, extremitatibus

subtiliter marginata. Scutellum triangulare, transversum, punc-tatum. Elytra fere parallela, apicem versus vix ampliata, an-gulis posticis breviter rotundata, apice separatim vix oblique truncata, circiter 1 et $\frac{1}{2}$ longiora quam simul in maxima lati-tudine latiora, lineato-punctata; lineis dorsalibus paulo ante apicem evanescentibus, margine apicali subtilissime punctulata; linearum punctatorum intervallis quam punctis multo latioribus. Abdomen subtiliter punctulatum; ultimo segmento paulo elon-gato, apice late hebetato.

Longueur, 4 millimètres.

Oblong, plus de quatre fois plus long que large dans sa plus grande largeur, médiocrement convexe, brillant, glabre, rougeâtre; tête, massue des antennes, moitié apicale et extrêmes marges latérales des élytres, un peu assombries. Antennes assez courtes; 1^{er} article arqué, dilaté, arrondi en-dedans, 4^{me} à 8^{me} s'épaississant progressivement, 7^{me} et surtout 8^{me} très transver-saux; massue piriforme, environ une fois et un tiers plus longue que large, dernier article à peine plus étroit que le précédent, légèrement séparé du suivant, terminé par une partie acuminée, très surbaissée. Tête assez convexe, environ deux fois plus large avec les yeux que longue, densément pointillée sur le front, très légèrement impressionnée de chaque côté vers la base de l'an-tenne; épistome saillant anguleusement en avant des bases des antennes, à peine sinuée sur les côtés, émoussé au sommet, très finement pointillé; yeux peu saillants, allongés, échancrant à peine les marges du front; leurs bords internes médiocrement con-vergents. Prothorax transversalement subconvexe, un peu plus rétréci en avant qu'à la base, médiocrement arqué sur les côtés, présentant sa plus grande largeur vers le milieu de la longueur, environ une fois et demie plus large dans sa plus grande largeur que long, plus fortement ponctué que le front. Bord anté-rieur à peine sinué, brièvement et un peu obliquement réfléchi en arrière aux extrémités; angles antérieurs médiocrement obtus; marges latérales infléchies, subpliées, bordées par un fin bourrelet et par une étroite cannelure; angles postérieurs faiblement obtus; base subtronquée, finement rebordée. Ecusson triangu-laire, environ deux fois plus large que long, subégal à la base au tiers de la largeur des élytres, assez éparsément pointillé. Ely-tres subarqués ensemble à la base, en angles obtus aux épaules, alors à peu près aussi larges ensemble, que le prothorax dans sa plus grande largeur, droites sur les côtés, à peine visiblement élargis vers le sommet, arrondis aux angles apicaux externes, séparément et un peu obliquement subtronqués au sommet, en-viron une fois et un cinquième plus longs que larges ensemble

dans la plus grande largeur, assez finement ponctués en lignes; lignes ponctuées arrêtées près du sommet, laissant libre une marge très finement pointillée; intervalles des lignes ponctuées, plans, beaucoup plus larges que les points; marge apicale très étroitement subinfléchie, finement rebordée; marges latérales lisses, infléchies, à peine pliées, très infléchies au dessous du calus huméral. Segments de l'abdomen très finement et peu densément pointillés; dernier segment à peine plus long que large, largement émoussé au sommet; carènes latérales à peine marquées, réduites presqu'à de simples lignes. Dessous du corps roux fauve, finement et peu densément pointillé. Tibias antérieurs armés à l'angle apical externe de deux petites épines séparées.

Luzon, Laguna, Mont Maquiling (Baker), 1 exemplaire femelle, collection A. Grouvelle.

Appartient au même groupe que *B. nitidus* Grouv. de Sumatra.

Ithyphenes bakeri sp. nov.

Elongatus, antice paulo latior, depresso, glaber, rufo-testaceus; elytris praeter basin nigris; mandibulis et abdominis ultimis segmentis infuscatis. Caput transversum, fronte sub-convexusculum, in disco tenuiter et plus minusve, parce, antice paulatim tenuissime punctulatum; margine antico medio quadrato-producto et utrinque bi-sinuato; epistomo antice breviter fortiter que impresso, basi in longitudinem sulcato. Prothorax transversus, basin versus angustatus, plus minusve parce punctulatus; margine antice modice arcuato, extremitatibus vix sinuato; angulis anticis vix obtusis, hebetatis; lateribus antice arcuatis, subparallelis, postice rotundatis; angulis posticis vix perspicue indicatis, late rotundatis; basi truncata; marginibus lateralibus anguste rotundato-inflexis. Scutellum subtriangulaire, transversissimum. Elytra circiter 1 et $\frac{1}{4}$ longiora quam simul latiora, angulis postico-externis latissime rotundatis, apice subtruncata, validius quam prothorax et plus minusve parce punctulata; punctis apicem versus attenuatis, ad basin in lineas inaequalissimas dispositis. Abdominis ultimum segmentum subdense punctulatum.

Longueur, 8.5 millimètres.

Environ cinq fois plus long que large, un peu atténué vers l'arrière, déprimé, brillant, glabre, roux testacé; élytres noirs, sauf une large bande basilaire; mandibules, extrême marge antérieure de la tête et dernier sternites enfumés. Antennes courtes; massue forte, brusque, environ une fois et demie plus longue que large; 1^{er} article légèrement séparé des suivants. Tête environ une fois et un quart plus longue que large, très

légèrement convexe sur le disque; plus ou moins éparsément ponctuée, encore plus finement sur la marge antérieure; intervalles des points à peine visiblement et très éparsement pointillés; tempes arquées, subparallèles, très allongées; côtés entre les yeux et la base des antennes très convergents; bord antérieur saillant en forme de rectangle au milieu, bisinué de chaque côté; 1^{er} sinus entre la saillie de l'épistome et la mandibule, prolongé en arrière par une impression; 2^{me} entre le bord interne de la mandibule et la naissance de l'antenne, fortement infléchi en avant; épistome fortement infléchi, brièvement redressé, explané en avant, saillant en angle obtus, longitudinalement et brièvement sillonné sur sa partie basilaire; marges latérales fortement infléchies; yeux petits, un peu saillants, latéraux. Prothorax très rétréci à la base, un peu plus de deux fois plus large dans sa partie antérieure que long, environ aussi large dans cette partie que la tête, couvert d'une ponctuation fine, irrégulièrement éparsé. Bord antérieur très faiblement arqué, à peine subsinué aux extrémités, très finement rebordé de chaque côté; angles antérieurs faiblement obtus, émoussés; côté subparallèle, faiblement arqué dans la partie antérieure, fortement arrondi dans la partie basilaire; marges latérales très fortement infléchies, très finement rebordées, cachées dans la partie antérieure lorsque l'insecte est vu de dessus; angles postérieurs presque complètement effacés, largement arrondis; base tronquée, rebordée. Ecusson subtriangulaire, environ deux fois et demie plus large à la base que long; presque lisse. Elytres infléchis un peu obliquement de chaque côté de l'écusson, brièvement arrondis aux épaules, alors plus étroits que le prothorax dans sa plus grande largeur, droits sur les côtés, faiblement élargis vers le sommet, très largement arrondis aux angles postérieurs-externes, très largement arrondis ensemble au sommet, environ une fois et un quart plus longs que larges ensemble dans leur plus grande largeur, couverts d'une ponctuation un peu plus forte et plus serrée que celle du prothorax, atténuee vers le sommet, disposée en lignes très irrégulières sur la partie basilaire; marges latérales fortement infléchies surtout à la base, finement rebordées. Segments abdominaux progressivement plus densément et plus fortement pointillés vers l'extrémité. Dernier sternite un peu plus large que long, arrondi au sommet.

Luzon, Tayabas, Malinao (Baker), 1 exemplaire femelle, collection A. Grouvelle.

Vient se placer à côté de *I. ustipennis* Fairm. dans le tableau publié.¹

¹ Rev. d'Ent. (1908), 26, 3.

Platynema angusta sp. nov.

Subparallela, circiter septies longior quam in maxima latitudine latior, subdepressa, nitida, praeter abdominis marginibus lateribus glaber, rufo-testaceus, vix perspicue infuscatus; antennarum clava, elytris praeter marginem basilarem et abdominis segmento ultimo plus minusve infuscatis. Caput sesquilongius quam latius, ante antennarum bases subparallelum, antice utrinque transversim truncatum, medio subinflexum, quadrato-productum et sat profunde sinuatum, in medio frontis disco subdense punctatum, punctis circum attenuatis. Prothorax subelongatus, lateribus arcuatus, postice quam antice angustior, transversim modice convexus, parce tenuiterque punctulatis, in longitudinem vix striatus; margine antico truncato; angulis anticis obtusis, posticis late rotundatis; basi vix arcuata, extremitatibus impressa. Scutellum latissimum, transversissimum, apice late obtuse angulosum. Elytra apicem versus aliquid ampliata, sesquilongiora quam simul in maxima latitudine latiora, apice separatis latissime subarouata, punctato-striata; striis prope apicem evanescentibus, punctis fortiter attenuatis; angulis posticis rotundatis. Abdominis ultimum segmentum elongatum, apice rotundatum, dense punctatum, lateribus subconcaudum.

Longueur, 5.5 millimètres.

Subparallèle, environ sept fois plus long que large dans sa plus grande largeur, subdéprimé, brillant, glabre sauf des poils flaves, plus ou moins dressés, insérés sur les marges latérales des élytres et de l'abdomen; roux testacé; massue des antennes, une très large bande au sommet des élytres et dernier segment de l'abdomen plus ou moins enfumés. Antennes courtes; massue forte, brusque, plus d'une fois et demie plus longue que large; 1^{er} article légèrement séparé du second. Tête environ une fois et demie plus longue que large, subrectangulaire entre la base et la naissance des antennes, déprimée sur le front, couverte d'une ponctuation fine, plus forte sur le disque que sur les côtés; bord antérieur transversalement tronqué contre les bases des antennes, saillant au milieu (épistome) en forme de rectangle légèrement infléchi, assez profondément sinué au milieu du bord antérieur; marges latérales fortement infléchies, surtout contre les yeux; ceux-ci un peu allongés, peu saillants, latéraux. Prothorax rétréci à la base, arqué sur les côtés, surtout dans la moitié basilaire, présentant sa plus grande largeur vers le premier tiers de la longueur à partir de la base, environ une fois et demie plus long que large dans cette plus grande largeur, subdéprimé sur le disque, couvert d'une ponctuation

plus fine que celle de la tête, plus ou moins éparses sur le disque, un peu plus forte vers les côtés, laissant au milieu un espace longitudinal lisse, très finement strié sur sa partie basilaire. Bord antérieur tronqué; angles antérieurs obtus, marges latérales fortement infléchies contre les angles antérieurs, lisses; bord latéral caché en avant lorsque l'insecte est vu de dessus; angles postérieurs à peine marqués, paraissant par suite fortement arrondis; base à peine arquée, finement rebordée aux extrémités; marge basilaire très brièvement infléchie, impressionnée de chaque côté contre l'angle postérieur. Ecusson subtriangulaire, très large et très transversal, à peine ponctué, transversalement substrié, à la base, de chaque côté. Elytres subsinués de chaque côté de l'écusson, arrondis aux épaules, alors à peu près aussi larges ensemble que le prothorax dans sa plus grande largeur, presque droite sur les côtés, très faiblement élargis vers l'extrémité, largement arrondis aux angles postérieurs-externes, subarqués séparément au sommet; environ une fois et demie plus longs que larges ensemble dans leur plus grande largeur, ponctués-striés; stries ponctuées disparaissant, près de l'extrémité, dans une ponctuation très fine, confuse et très éparses; intervalles des stries plus larges sur le disque que les points. Marges latérales fortement infléchies dans la région des épaules et contre la base, moins fortement vers le sommet, et encore moins fortement sur la partie apicale. Segments dorsaux de l'abdomen progressivement plus fortement ponctués vers l'extrémité; le 1^{er} éparsément, le 2^{me} un peu moins éparsement, le dernier beaucoup plus densément. Dernier segment près d'une fois et un tiers plus long que large, subacuminé à l'extrémité, bordé à la base et sur les côtés, sauf sur la partie apicale, par une carène un peu obtuse, enfermant un espace transversalement subconvexe au milieu, concave contre les carènes. Dernier segment de l'abdomen rugueusement ponctué vers le sommet, tronqué chez le mâle.

Luzon, Laguna, Mont Maquiling (Baker), 1 exemplaire mâle, collection A. Grouvelle.

Amystrops monticola sp. nov.

Breviter oblongus, convexiusculus, nitidulus, tenue flavo-pubesca, fulvus; elytris infuscatis, circa scutellum paulo dilutioribus. Antennae fere breves; 1^o articulo subelongato, incrassato intus mediocriter rotundato-dilatato; clava piriformi, plus duplo longiore quam latiore, articulis vix densatis. Caput transversum, subdepressum, fronte dense punctulatum; epistomo trapeziformi, prope antennarum bases producto, transversim

subconvexo, subtiliter punctulato, basi utrinque juxta antennam impresso; oculis sub prominulis, oris internis fortiter convergentibus. Prothorax antice fortiter, postice vix angustatus, lateribus mediocriter arcuatus, in maxima latitudine plus duplo latior quam longior, quam caput minus dense sed paulo validius punctulatus; margine antico medio vix emarginato; angulis anticis arcuato subproductis; lateribus anguste marginatis; angulis posticis subacutis, retrorsum productis; basi truncata, utrinque ante scutellum breviter sinuata, extremitatibus retrorsum arcuata. Scutellum triangulare, transversum dense punctulatum. Elytra rotundata, lateribus arcuata, vix ampliata, apicem versus attenuata, apice separatim oblique subtruncata minus longiora quam simul in maxima latitudine latiora, subdense et capite validius punctulata; punctis subasperis ad latera apicemque attenuatis. Pygidium convexiusculum, apice rotundato-acuminatum, dense subtiliterque punctulatum.

Longueur, 1.7 millimètres.

Oblong, environ une fois et demie plus long que large dans sa plus grande largeur, médiocrement convexe, brillant, couvert d'une pubescence flave très fine, roux fauve; élytres un peu rougeâtres, plus claires sur la région scutellaire. Antennes assez courtes; 1^{er} article un peu allongé, épais, dilaté, arrondi en dedans; 2^{me} encore épaisse, plus long que large; 3^{me} plus de deux fois plus long que large, un peu plus long que le 2^{me}; 4^{me} allongé; 5^{me} encore un peu plus allongé; 6^{me} et 7^{me} subtransversaux, 8^{me} transversal, amorçant la massue; celle-ci piriforme, un peu plus de deux fois plus longue que large, subégale au tiers de la longueur totale de l'antenne, dernier article presqu'aussi long que les deux premiers réunis, terminé par une partie conique. Tête environ deux fois plus large avec les yeux que longue, subdéprimée et densément pointillée sur le front; épistome saillant en forme de trapèze, presque contigu à la base aux naissances des antennes, transversalement subconvexe, tronqué au bord antérieur, très finement pointillé, séparé du front de chaque côté vers la base de l'antenne par une faible impression; labre bien visible, arrondi sur les côtés, échancré en triangle; tempes effacées; yeux médiocrement saillants, échançrant à peine les marges du front, leurs bords internes très convergents. Prothorax faiblement convexe dans la longueur, fortement dans la largeur, assez fortement rétréci en avant, très faiblement à la base, arqué sur les côtés, présentant sa plus grande largeur très près de la base, un peu plus de deux fois plus large dans sa plus grande largeur que long, couvert d'une ponctuation faiblement rugueuse, un peu moins serrée et

un peu forte que celle de la tête. Bord antérieur largement et faiblement échancré, saillant légèrement en avant aux extrémités en forme de lobe arqué, par suite angles antérieurs arrondis; bords latéraux étroitement bordés; angles postérieurs aigus, saillants en arrière; base tronquée, arquée à l'arrière vers les extrémités, brièvement sinuée de chaque côté de l'écusson, bordée aux extrémités par le prolongement de la bordure des côtés. Ecusson triangulaire, environ deux fois plus large à la base que long, densément pointillé. Elytres subtronqués à la base, largement arrondis aux épaules, arqués sur les côtés, à peine élargis, présentant leur plus grande largeur près de la base, atténues séparément et un peu obliquement subtronqués au sommet, nettement plus courts que larges dans leur plus grande largeur, couverts d'une ponctuation nettement plus écartée et plus forte que celle du prothorax, subrugueuse, atténuee vers les marges latérales et apicales; ces dernières très finement rebordées. Pygidium subdéprimé, densément et finement pubescent; pygidium du mâle tronqué, complété par un segment supplémentaire.

Luzon, Laguna, Mont Maquiling (Baker), 1 exemplaire mâle, collection A. Grouvelle.

Carpophilus (Eidoclastus) subplanus sp. nov.

Breviter oblongus, fere planus, nitidus fere omnino glaber, rufo-testaceus; capite antennarum clava et scutello satis, prothorace abdomineque vix, infuscatis; elytris dilute ochraceo-testaceis. Antennae subbreves; clavae 1^o articulo ab secundo disjuncto. Caput transversum, fronte sat convexum, dense punctulatum, utrinque ad antennae basin impressum; epistomo separatim convexiusculo, subtrapezoidal, antice truncato, lateribus fortiter sinuato; oculis sub prominulis, oris internis convergentibus; temporibus haud manifestis. Prothorax transversim convexus, antice quam postice paulo magis angustatus, lateribus arcuatus juxta basin vix perspicue sinuatus, in maxima latitudine plus duplo latior quam longior, in disco quam caput minus dense valideque punctulatus, punctis ad latera densioribus validioribusque; margine antico subsinuato; angulis anticis obtusis; lateribus anguste marginatis; angulis posticis acutis; basi medio vix sinuata, utrinque subrecta, anguste marginata. Scutellum transversum, subtriangulare, lateribus juxta basin arcuaturn, in disco subtiliter punctulatum. Elytra humeris angulosa, lateribus arcuata, vix perspicue ampliata, angulis apicalibus hebetata, apice separatim oblique subtruncata, disco depressa, dense et quam caput minus valde punctulata; punctis subasperis, ad

latera apicemque attenuatis. Pygidium convexiusculum, apice subacuminatum, crebre subrugosaeque punctulatum.

Longueur, 2.5 millimètres.

Oblong, environ deux fois et un tiers plus long que large dans sa plus grande largeur, à peine convexe, brillant, glabre sur la tête, le prothorax et les élytres, à peine pubescent sur l'abdomen, roux testacé; tête, massue des antennes et écussion un peu enfumés; prothorax et abdomen encore moins enfumés; élytres testacé jaunâtre clair; suture, marges latérales et apicales très étroitement rembrunies. Antennes assez courtes; 1^{er} article épais, arqué, dilaté en dedans; 2^{me} encore épais, plus long que large; 3^{me} plus de trois fois plus long que large, 4^{me} et 5^{me} un peu allongés, 6^{me} et 7^{me} subtransversaux, 8^{me} transversal, amorçant légèrement la massue; celle-ci brusque, moins d'une fois et demie plus longue que large; 1^{er} article séparé du second. Tête un peu plus de deux fois plus large avec les yeux que longue, assez convexe sur le front, densément pointillée, impressionnée de chaque côté vers la naissance de l'antenne; épistome subtrapézoïdal, transversal, tronqué au bord antérieur, fortement sinué sur les côtés, légèrement convexe, séparé du front par une légère dépression arquée, s'étendant entre les impressions des bases des antennes; yeux médiocrement saillants, échancrant légèrement les marges latérales du front, leurs bords internes convergents; tempes effacées. Prothorax transversalement convexe, un peu plus rétréci au sommet qu'à la base, arqué sur les côtés, très brièvement subsinué contre la base, présentant sa plus grande largeur un peu après le milieu de la longueur, un peu plus de deux fois plus large dans sa plus grande largeur que long, moins densément ponctué sur le disque que la tête. Bord antérieur subsinué; angles antérieurs obtus; côtés bordés par un fin bourrelet et par une fine cannelure, encore plus étroite au sommet, s'arrêtant contre l'angle postérieur; celui-ci un peu aigu, très légèrement réfléchi en arrière; base subtronquée, brièvement et très faiblement arquée vers l'arrière aux extrémités, très étroitement rebordée. Marges latérales convexes; marge basilaire très brièvement infléchie contre la bordure marginale. Ecussion en forme de triangle curviligne à courbure très accentuée sur les côtés contre la base, plus de deux fois plus large à la base que long, très finement ponctué sur sa partie médiane. Elytres déprimés, subtronqués à la base, en angles un peu obtus aux épaules, arqués sur les côtés, à peine élargis, présentant leur plus grande largeur vers le premier tiers de la longueur à partir de la base, médiocrement atténues vers le sommet, émoussés aux angles apicaux externes, séparément et

un peu obliquement subtronqués au sommet, environ une fois et un sixième plus larges ensemble, dans leur plus grande largeur, que longs, densément ponctués, mais moins fortement que la tête: ponctuation subrugueuse, atténuée vers la base et vers le sommet. Marge basilaire fortement et très étroitement infléchie, très finement rebordée; marges latérales subpliées, bordées par un fin bourrelet et par une étroite cannelure; marge apicale très finement rebordée. Pygidium subconvexe subtriangulaire, presqu'acuminé au sommet, très densément et subrugueusement ponctué. Dessous du corps rougeâtre; abdomen densément pointillé.

MINDANAO, Zamboanga (*Baker*), 1 exemplaire femelle, collection A. Grouvelle.

Carpophilus sinuatus sp. nov.

Breviter oblongus, convexus, nitidus, glaber, piceus: antennis, praeter clavam, capitis anguste marginे antico et prothoracis angulis posticis rufo-piceis. Antennae subelongatae: clavae 1^o articulo ab secundo disjuncto. Caput transversum, fronte sat convexum, dense punctulatum, utrinque ad antennae basin tenuiter impressum; epistomo depresso, subtrapezoidali, antice truncato et angustissime inflexo, lateribus profunde sinuato et anguste inflexo, subtiliter punctulato; oculis vix prominulis, oris internis subsinuatim, convergentibus; temporibus haud manifestis. Prothorax in longitudinem vix transversim, sat fortiter convexus, antice satis, postice vix perpicue, angustatus, lateribus antice arcuatus, postice subparallelus, circiter in maxima latitudine duplo latior quam longior, in disco quam caput minus dense, sed paulo fortius punctatus, punctis ad latera densioribus et minoribus; margine antico emarginato; angulis anticis obtusis, antrorsum productis; lateribus subtiliter marginatis; angulis posticis acutis, retrorsum productis, basi medio vix utrinque paulo magis sinuata. Scutellum transversum, subtriangulare; lateribus juxta basin arcuatis; disco subtilissime punctulato. Elytra humeris angulosa, lateribus arcuata, subampliata, angulis posticis hebetato-obtusa, apice separatim oblique truncata, in maxima latitudine latiora quam longiora, fere sicut caput punctata; marginibus lateralibus breviter fortiterque inflexis, anguste marginatis. Pygidium convexiusculum, apice subacuminatum, crebre subrugoseque punctulatum.

Longueur, 2.2 millimètres.

Oblong, un peu plus de deux fois plus long que large dans sa plus grande largeur, convexe, brillant, glabre, brun de poix; prothorax, écusson et extrême marge apicale des élytres à peine

plus claire; antennes sauf la massue et bord antérieur de la tête roux teinté de couleur de poix. Antennes médiocrement courtes; 1^{er} article épais, arqué, dilaté en dedans; 2^{me} encore épais, un peu plus long que large; 3^{me} environ deux fois plus long que large, plus long que le 2^{me}, 4^{me} et 5^{me} subcarrés, 6^{me} et 7^{me} transversaux, 8^{me} très transversal, amorçant faiblement la massue; celle-ci brusque, environ une fois et demie plus longue que large; 1^{er} article séparé du 2^{me}, 3^{me} plus étroit que le 2^{me}. Tête relativement large, un peu plus de deux fois plus large avec les yeux que longue, convexe sur le front, densément pointillée, faiblement impressionnée de chaque côté vers la naissance de l'antenne; épistome subtrapézoïdal, transversal, assez saillant, déprimé fortement et brièvement infléchi en avant et sur les côtés, tronqué au bord antérieur, profondément sinué sur les côtés, très finement pointillé; yeux assez gros, peu saillants, échancrant légèrement les marges latérales du front; leurs bords internes convergents; tempes effacées, bord basilaire de la tête, de chaque côté du cou, oblique. Prothorax faiblement convexe dans la longueur, surtout vers les marges latérales, rétréci en avant, à peine visiblement à la base, arqué en avant sur les côtés, subparallèle dans la partie basilaire, un peu plus de deux fois plus large dans cette partie que long, moins densément, mais plus fortement ponctué sur le disque que la tête; ponctuation un peu plus serrée et plus fine sur les côtés, laissant libre sur le disque un espace longitudinal, court et étroit. Bord antérieur largement et peu profondément échancré, brièvement et très fortement infléchi aux extrémités; angles antérieurs obtus, un peu saillants en avant; marges latérales brièvement et fortement infléchies, finement bordées; angles postérieurs aigus, saillants en arrière, assez largement subdéprimés sur leur région apicale; base faiblement sinuée au milieu, plus fortement de chaque côté, surtout vers les extrémités, finement rebordée. Ecusson subtriangulaire, environ deux fois plus large à la base que long, arrondi sur les côtés contre la base, très finement ponctué sur le milieu. Elytres subtronqués à la base, arqués aux extrémités, en angles obtus aux épaules, arqués, un peu élargis sur les côtés, présentant leur plus grande largeur vers le premier tiers de la longueur à partir de la base, en angle obtus émoussé aux angles apicaux externes, obliquement et séparemment tronqués au sommet, presqu'une fois et demie plus larges dans leur plus grande largeur que longs, ponctués comme la tête, mais moins densément; points atténus et plus serrés vers le sommet; intervalles des points à peine visiblement chagriniés, un peu plus visiblement sur la marge apicale. Marges latérales for-

tement inféchies surtout au-dessous du calus huméral, bordées par un très fin bourrelet et par une cannelure beaucoup plus large. Pygidium subconvexe, subtriangulaire, transversal, presqu'acuminé à l'extrémité, très densément et subrugueusement ponctué. Dessous du corps roux de poix, pattes plus claires.

PALAWAN, Puerto Princessa (*Baker*), 1 exemplaire, collection A. Grouvelle.

Prometopia bakeri sp. nov.

Subparallelia, paulo plus duplo longior quam latior, convexa, nitidula, setis vix incrassatis, subbrevis, flavo-albidis, inclinatis subparce vestita, pilis multo tenuioribus intermixtis; capite prothoraceque rufo-fuscis, elytris nigris, singulo rufo bimaculato; 1^o macula discoidali, ad longitudinis primum trientem, oblonga, obliqua; 2^o discoidali, ad longitudinis ultimum quadrantem, suborbiculari. Antennae subelongatae; clava piriformi plus duplo longiore quam latiore. Caput transversum fronte convexiusculum et subdense granulatum; epistomo subdepresso, antice truncato; labro transversissimo, antice rotundato; oculis sat prominulis, granis sat validis. Prothorax lateribus modicissime arcuatus, suparallelus, antice aliquid angustatus et capite paulo latior, in maxima latitudine paulo plus duplo latior quam longior, punctis ocellatis, ad latera magis validis plus minusve parce punctatus, margine antico late marginato; angulis anticis acutis antrorum productis, lateribus auguste marginatis; angulis posticis subrectis; basi ante scutellum truncata, utrinque sinuata, extremitatibus retrorum producta, angustissime marginata. Scutellum subtriangulare, transversissimum. Elytra basi sat longe parallela, apice conjunctim rotundata, circiter 1 et ½ longiora quam simul basi latiora, dense subrugoseque punctata; punctis ad apicem attenuatis, lateribus striate rufo-marginatis.

Longueur, 3.5 millimètres.

Presque parallèle, faiblement atténue vers l'arrière, un peu plus de deux fois plus long que large dans sa plus grande largeur; médiocrement convexe dans la longueur, plus fortement dans la largeur, assez brillant, couvert d'une vesture comprenant: 1^o des poils squamiformes, assez courts, inclinés, flave blanchâtre plus ou moins un peu écartés; 2^o des poils petits, très fins, un peu plus foncés, plus serrés que les premiers; couleur noir très faiblement rougeâtre sur la tête et le prothorax; antennes et extrêmes marges latérales du prothorax et des élytres et dessous du corps roux testacé; sur chaque élytre deux tâches rouges: la 1^{re} discoïdale, après le premier tiers de la longueur à partir de la base, oblongue, inclinée vers l'extré-

mité, la 2^{me} également sur le disque, vers le dernier quart de la longueur, suborbiculaire. Antennes un peu allongées; 1^{er} article épais, un peu plus long que large, dilaté arrondi en dedans; 2^{me} encore un peu épais, suballongé; 3^{me} à peine épaissi, environ quatre fois plus long que large, 4^{me} à peine allongé, 5^{me} et 6^{me} subcarrés, 7^{me} et 8^{me} progressivement à peine épaisse, à peine allongés; 9^{me} et 11^{me} formant une massue subpiriforme, légèrement dissymétrique, moins d'une fois et demie plus large que longue, dont le dernier article plus étroit que le précédent est terminé par une partie émoussée. Tête moins de deux fois plus large avec les yeux que longue, légèrement convexe, sur le disque du front, étroitement infléchie de chaque côté, au dessus des yeux, contre l'épistome en arc saillant en avant, celui-ci subdéprimé, trapézoïdal, assez saillant en avant des bases des antennes, tronqué au bord antérieur; front couvert de granulations peu serrées et peu marquées, très finement striées-entourées, devenant plus faibles sur l'épistome. Yeux latéraux, saillants presqu'en forme de demi circonférence, plus fortement arrondis en avant qu'en arrière; facettes assez fortes. Mandibules saillantes; labre très transversal, arrondi, un peu infléchi en avant, subrugueux. Prothorax à peine convexe dans la longueur, plus fortement dans la largeur, subparallèle, arqué, un peu rétréci en avant, à peine plus de deux fois plus large à la base que long, couvert de points superficiels, ocellés, petits et espacés sur le disque, plus forts, plus serrés et subrugueux sur les marges latérales; intervalles très finement et peu densément pointillés. Bord antérieur largement échancré, légèrement arqué en avant au milieu, très étroitement rebordé aux extrémités; angles antérieurs aigus, saillants en avant; côtés bordés par un fin bourrelet et par une cannelure très étroite à la base, un peu plus large vers l'avant s'étendant sur l'angle antérieur; angles postérieurs presque droits, émoussés; base tronquée devant l'écusson, largement sinuée, légèrement infléchie vers l'arrière de chaque côté, étroitement rebordée, striée. Ecusson subtriangulaire, très transversal, légèrement enfoncé, pointillé à la base. Elytres arqués à la base en angles obtus aux épaumes, subparallèles, assez longuement atténus vers le sommet, brièvement arrondis ensemble, environ une fois et un tiers plus longs que larges ensemble, densément et subrugueusement ponctués; points atténus vers le sommet; marges latérales étroitement bordées par un fin bourrelet et par une fine cannelure qui s'atteignent vers le sommet.

Luzon, Laguna, Mont Maquiling (Baker), 1 exemplaire mâle, collection A. Grouvelle.

THE CARPENTER BEES OF THE PHILIPPINE ISLANDS

By T. D. A. COCKERELL.

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The carpenter bees (*Xylocopidae*), so-called because they nest in wood, are easily recognized by their large size and robust form; the wings are often brilliantly iridescent. They are commonly seen about houses. Two genera may be recognized, *Mesotrichia* Westwood and *Xylocopa* Latreille. *Koptorthosoma* Gribodo, *Platynopoda* Westwood, and *Cyaneoderes* Ashmead are here regarded as divisions of *Mesotrichia*. In *Mesotrichia* the hind part of the thorax is flattened (at least in the females), the scutellum having a sharp rim, and this posterior thoracic truncation faces a similar basal truncation of the abdomen. The basal segment of the abdomen contains a pouch, which opens on the anterior face, and in this pouch will be found mites of the genus *Paragreenia* Cockerell (family Gamasidae). In true *Xylocopa* the hind part of the thorax is rounded as in other bees, and the first abdominal segment also lacks a sharp or angular rim above its basal declivity.

For my Philippine material of this group I am indebted to Professor C. F. Baker. It was principally collected for him by Mr. Julian Valdez, who visited many of the islands for the purpose.

Genus XYLOCOPA Latreille

Species.

- a'. Face of male narrow, the area below antennae about as broad as long; sexes differently colored, the male with a good deal of olive-brown hair, the female black, with the abdomen dark green.
fuliginata Pérez.
- a'. Face of male broad, the area below antennae much broader than long.
 - b'. Wings brilliant rosy purple, with the apical field peacock green; anterior wing of female 28 millimeters long; abdomen black, without green tints (China)..... dissimilis Lep.
 - b'. Wings otherwise colored, not so brilliant.
 - c'. Abdomen black; male with only a small part of clypus (band at upper end) light mimetica Ckll.
 - c'. Abdomen distinctly greenish; male with larger part of clypus pale. fallax Maidl.

Xylocopa fuliginata Pérez, 1901.

MINDANAO, Dapitan, Iligan, and Davao (*Baker*) ; BASILAN (*Baker*) ; LUZON, Benguet, Baguio, and Laguna, Mount Maquiling (*Baker*). Probably the commonest species in the Philippines. Pérez described it from Mindanao and Palawan; the former is to be considered the type locality.

Xylocopa mimetica Cockerell, 1915.

PALAWAN.

Xylocopa fallax Maidl. 1912.

Luzon, Benguet, Baguio (Baker), 2 males.

The three following species of *Xylocopa* have not been seen from the Philippines by me, and their presence there, though reported, requires confirmation:

Xylocopa dissimilis Lepeletier, 1841.

Probably the Philippines supposed dissimilis was fallax.

Xylocopa tranquebarica (Fabricus), 1804.

This is more generally known as *X. rufescens* Smith. It is a large ferruginous insect, quite unlike anything I have seen from the Philippines. It has the curious habit of flying at night.

Xylocopa sonorina Smith, 1874.

Sunda Island; probably not in the Philippines. The female has the pubescence all black, except on anterior tarsi beneath, where it is ferruginous; wings fuscohyaline, with darker cloud beyond cells, and with bright purple and coppery iridescence.

Genus MESOTRICIA Westwood

Species.

- a'. Thorax covered with bright yellow hair above, abdomen black, wings very dark (Sumatra, etc.) *confusa* Pérez, ♀.

a'. Thorax with fox-red hair above (with some black), abdomen black. *cuernevicensis* Chikl.

a'. Thorax and abdomen covered with greenish or tawny hair.

b'. Hair of thorax yellowish; anterior wing a little over 17 millimeters. *bakeriana* Chikl., ♂.

b'. Hair of thorax green or greenish.

c'. Anterior wing about 20 millimeters..... *euchlora* Pérez, ♂.

c'. Anterior wing about 23' millimeters; very large, robust insect. *majuscula* Maidl., ♂.

a'. Thorax with at least the disk dark, abdomen with not more than first segment covered with light hair.

d'. Thorax with a yellow band in front and behind and first abdominal segment yellow-haired. *giglianii* Gribodo.

- d'*. Thorax with a yellow band behind and first abdominal segment yellow; a smaller species than the last. *philippinensis chlorina* Ckll.
d'. Much like the last, but thorax with two patches instead of a band posteriorly; wings dark rosy purple (green in *chlorina*).
philippinensis Smith.
- e'*. Thorax dark above; first abdominal segment without light hair.
e'. Very large, anterior wing over 25 millimeters.
f'. Scape enlarged at end.
g'. Wings brilliant green, brassy apically, purple at extreme base;
 male with anterior legs greatly modified *latipes* (Drury).
g'. Wings purple *latipes basiloptera* Ckll.
f'. Scape not enlarged at end; scutellum hairy (nude in *latipes*).
bombiformis Smith.
- e'*. Much smaller, anterior wing not nearly 25 millimeters long.
h'. Small species; anterior wing about 14 millimeters long; wings
 brassy *capitanensis* Ckll.
h'. Much larger.
t'. Wings brassy and coppery *bakeriana* Ckll., ♀.
t'. Wings green and purplish *amauroptera* Pérez.

The species tabulated are before me. I include some particulars in the following list concerning species that I do not possess:

Mesotrichia adusta (Pérez), 1901.

Female. Mindanao. Like *M. nobilis* as to size, and anterior and posterior borders of thorax yellow, but abdomen all black. In *M. nobilis*, *adusta*, and *occipitalis* the abdomen is very hairy, the surface being more or less completely covered. In *M. ghilianii*, which has similar yellow markings, the abdomen is less hairy, so that the surface is visible.

Mesotrichia amauroptera (Pérez), 1901.

PALAWAN, Puerto Princesa (*Baker*), 1 female.

Mesotrichia bakeriana Cockerell, 1914.

LUZON, Laguna, Los Baños, and Mount Maquiling (*Baker*), females. What I suppose to be the male comes from Mount Maquiling; it resembles *M. euchlora*, but is smaller and more tawny, not distinctly green.

Mesotrichia bombiformis (Smith), 1874.

LUZON, Benguet, Baguio; Laguna, Los Baños and Mount Maquiling (*Baker*). A large black insect; the wings purple, apically dark greenish. The hairy scutellum at once distinguishes it from *M. latipes*.

Mesotrichia clavicornis (Maidl), 1912.

Luzon and Ceylon, according to Maidl. Male near *volatilis* Smith; hind femora extremely broad. Clypeus reddish yellow.

Mesotrichia confusa (Pérez), 1901.

Reported as *aestuans* (which is African) and *bryorum* (which is Australian). It occurs in Java, Sumatra, etc.; I have no Philippine specimens.

Mesotrichia cuernosensis Cockerell, 1915.

NEGROS (*Baker*).

Mesotrichia dapitanensis Cockerell, 1915.

MINDANAO (*Baker*).

Mesotrichia euchlora (Pérez), 1901.

MINDANAO, Dapitan and Zamboanga (*Baker*), males. Maidl suggests that this is the male of *M. philippinensis*, which seems very probable.

Mesotrichia ghiliani (Gribodo), 1891.

MINDANAO, Iligan (*Baker*).

Mesotrichia major (Maidl), 1912.

LUZON, Tayabas, Malinao (*Baker*). Only the male known.

The type was collected in the Philippines by von Schadenberg in 1890.

Mesotrichia occipitalis (Pérez), 1901.

Female. Mindanao. Differs from *M. adusta* by yellow collar on prothorax, hair of abdomen black, etc.

Mesotrichia philippinensis (Smith), 1854.

LUZON, Tayabas, Malinao (*Baker*).

Mesotrichia philippinensis bilineata (Friese), 1914.

Female. Luzon. Smaller, pleura black-haired, hind margin of thorax with broader, yellower hair band. Length, 15 millimeters. Is this not a distinct species? I have not seen it.

Mesotrichia philippinensis chlorina Cockerell, 1915.

The common form at Los Baños, Luzon.

Mesotrichia sulcifrons (Pérez), 1901.

Female. Palawan. Length, 15 to 16 millimeters; allied to *amauroptera*. Wings only a little reddened, semitransparent. Hair of clypeus black.

Mesotrichia tricolor (Ritsema), 1878.

A species allied to *nobilis*, 27 millimeters long, from the Sula Islands. Its occurrence in the Philippines needs confirmation.

Mesotrichia trifasciata (Gribodo), 1891.

Female, 21 to 22 millimeters long. Mindanao. Very close to *M. nigroplagiata*, but head densely gray-haired. The first abdominal segment is densely yellow-haired.

Mesotrichia vachali (Pérez), 1901.

Male from Palawan. Very near to *M. confusa*; the yellow hair of thorax tinted with red; on abdomen the tint is olivaceous, becoming dusky from the admixture of black hairs. This also is related to *M. euchlora*.

Subgenus Platynopoda Westwood**Mesotrichia latipes (Drury), 1778.**

NEGROS, Cuernos Mountains (*Baker*), 1 female.

Mesotrichia latipes basileptera subsp. nov.

Female.—Length, about 28 millimeters; anterior wing, 28; wings very dark, splendid deep purple, the basal half with some bluish green tints. Scape broadened at end; lateral frontal basins extending above lateral ocelli.

PALAWAN, Puerto Princesa (*Baker*, 6298).

Mesotrichia tenuiscapa (Westwood), 1840.

Differs by the simple scape of antennæ, not distinctly enlarged at end. It occurs in India, and I have not seen Philippine specimens.

A NEW PHILIPPINE GENUS OF DELPHACIDÆ

By FREDERICK MUIR

(Honolulu, Hawaii)

Genus VIZCAYA novum

Head narrower than thorax; vertex longer than broad (1.70 to 1), base slightly wider than apex, mediolateral carinae meeting well before the apex, Y-shaped carina obsolete, length of face nearly two and one-half times the width at apex (1 to 2.4), apex wider than base, sides nearly straight, lateral carinae distinct, a single median carina faint on apical half and obsolete on basal half, a distinct carina across gena from base of antenna to the lateral corner of base of clypeus; clypeus shorter than face, tricarinate; head in profile rounded at junction of vertex and face. Antennæ nearly twice the length of head and pro- and mesothorax together, second joint more than one half longer than first (1.6 to 1), first joint flattened, wide, thin, second joint terete, evenly covered with raised sense organs and short spines. Hind margin of pronotum slightly and evenly emarginate, carinae obsolete; mesonotum with three very fine carinae. Legs long and slender, hind tibiae with one basal, one medio-apical, and five apical spines; hind tarsi not quite half the length of tibia, basal joint longer than the other two together (1 to .70), spur not as long as the basal joint, cultrate, convex on both sides, seven teeth on hind margin and one at the apex. Tegmen long, narrow, median vein not touching the radius.

This is a very distinct genus belonging to the Alohini and coming nearest to *Proterosydne*. It has some affinity, at least superficially, to *Lanaphora* of the Tropidocephalini.

Vincaya bakeri sp. nov.

Male.—Orange or ochraceous orange; vertex (except a triangular patch at each corner of base), base of face, and base of clypeus shiny black, antennæ dark brown, second joint darkest, tarsi fuscous, abdomen dark brown or black. Costal area to near apex and basal third of tegmen hyaline, rest of tegmen dark fuscous, darkest over apical third and fading toward base, veins concolorous with membrane, very fine granules bearing fine black hairs.

Anal segment larger, longer than wide, lateral edges turned ventrad forming a trough on ventral side, anus about middle; lateral edges of pygofer angularly produced halfway along anal segment; medioventral edge produced into two short, horizontally flattened, blunt spines; styles broadest at base, gradually narrowed to apex, flattened, forming a half spiral inward.

Length, 3.9 millimeters; tegmen, 4.6.

Female.—Similar to the male.

Length, 5 millimeters; tegmen, 5.4.

LUZON, Nueva Vizcaya Province, Imugan (*C. F. Baker*).
Cotype in Bureau of Science collection. This interesting delphacid is named for Prof. C. F. Baker.

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SNAKES AND LIZARDS KNOWN FROM NEGROS, WITH DESCRIPT-
TIONS OF NEW SPECIES AND NEW SUBSPECIES

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Manila)

TWO PLATES AND TWO TEXT FIGURES

This paper is based for the most part on collections made by myself in Occidental Negros, P. I. Two principal localities are represented: one is Isabela and the near-by mountains; the other, Mount Canlaon, or Malaspina, a volcano rising to a height of 2,461 meters in the north-central part of the island.

The most fertile field for collecting was on Canlaon Volcano at from 600 to 1,000 meters' elevation. Four trips were made to this mountain, and many specimens were taken. The mountain receives much rainfall during a large part of the year, and for the most part the collecting was done in a heavy downpour. Few places can boast of more mosquitoes. Two new species and three new subspecies of snakes and three new species and one new subspecies of lizards were collected. Many of the known species found exhibited marked variations from the lowland forms; this was especially noticeable in *Sphenomorphus steerei* and *Sphenomorphus jagori*. Most specimens, of both snakes and lizards, were noticeably colored on the ventral surface with canary yellow, a color that is usually wanting on the same species living in the lowlands.

The number of new and unusual species taken leads me to believe that when the mountain is thoroughly explored many other new species will be found.

Mr. Homer McNamara, superintendent of the La Carlota Agriculture Experiment Station, who accompanied me on two of my four trips to Canlaon, made a considerable collection of reptiles at the agricultural farm, which he very kindly presented to me.

The following new species and new subspecies¹ are described in this paper:

SNAKES

- | | |
|---|---|
| <i>Typhlops canlaonensis.</i> | <i>Calamaria gervasi tridescens.</i> |
| <i>Natrix dendrophiops negrosensis.</i> | <i>Trimeresurus wagleri albovittatus.</i> |
| <i>Pseudorhabdium mcnamarai.</i> | |

LIZARDS

- | | |
|-----------------------------------|---------------------------------------|
| <i>Lepidodactylus christiani.</i> | <i>Siaphos curiculatum.</i> |
| <i>Sphenomorphus arborens.</i> | <i>Leiolepisma pulchellum grande.</i> |

SNAKES

Typhlops braminus Daudin.

Common in certain localities. Mr. McNamara collected more than a hundred specimens of this diminutive snake on the agricultural farm at La Carlota. Most of these are dark purplish brown, other specimens are dull pearl-gray. This color does not seem to be caused by age, by disease, or wholly by the fact that the individual is on the point of shedding its skin, since young, old, and newly shed specimens are among the lot. Careful study revealed no other variation save that the scales, especially those on the head, seemed thicker and the eye was dim or totally obscured.

Typhlops canlaonensis sp. nov.

Type.—No. 241, E. H. T. collection. Canlaon Volcano, Negros, P. I.; December 25, 1915; elevation about 750 meters. E. H. Taylor, collector.

Description of type.—Head depressed, a little wider than body; snout projecting moderately; rostral elliptic, distinctly wider behind than at tip of snout and failing to reach level of eyes by half the width of prefrontal, more than one third the width of head; nostrils lateral, not visible from above; nasals large, not in contact behind rostral, not completely divided by nasal cleft, which arises from second labial and passes through nostril and to a point about halfway from nostril to rostral; nasal in contact with first three labials; preocular present, narrowed to a point above, its greatest width, equal to that of ocular, occurs below level of eye; narrowly in contact with supra-ocular above

¹ All specimens, unless otherwise noted, are in my private collection.

and with only the third labial below; practically the same length as ocular; the latter somewhat rectangular in outline, rapidly narrowed to a point above and below, in contact with third and fourth labials; ocular bordered posteriorly by two somewhat enlarged body scales (three on left side); prefrontal wider than deep, distinctly larger than frontal, which is somewhat wider than long and narrowly in contact with prefrontal; supra-oculars larger than either of these scales and about equal in size to parietals, which are a little more elongate and more than half lying behind oculars; interparietal scale not as large as frontal. Eye visible near anterior border of ocular, much below the point of contact with supra-ocular; eye rather large, pupil distinct and whitish; 80 scale rows about the body; tail ending in a sharp spine.

*Measurements of the type of *Typhlops canlaonensis* sp. nov.*

	mm.
Length	122
Length of tail	2.5
Width of head	4.2
Width of body	3.5-3.66
Width of tail	3

Color in life.—Above shiny greenish black (appearing greenish in certain lights); snout dark brown; underside of snout, belly, and entire tail pinkish yellow. The dark and the yellow areas are well defined, the black covering 15 scale rows. Head with narrow lighter lines, outlining, more or less, the head scales.

Remarks.—This species is related to *T. ruficauda* Gray, but differs much in color. The rostral does not reach the level of eye and is wider; the tail is wider than long. In coloring it resembles *T. jagori* Peters, from Luzon; but the nasals are not completely divided and do not touch behind the rostral; the second labial is far from twice as large as the first; the tail is pinkish yellow. It is impossible to tell whether the specimen at hand is adult or not. However, it is probable that it is a smaller form than the other two above-mentioned species. Only one specimen was found, although the locality was very thoroughly searched. It was found burrowing under a decayed log.

Python reticulatus Schneider.

Various specimens have been observed in captivity in Negros. There is none in the collections I have studied. Mr. McNamara reports that he killed two of these snakes on the agricultural farm. Each was more than 3 meters in length.

Chersydrus granulatus Schneider.

Common along the coasts of Negros; three specimens in the collection are from Hinigaran.

Natrix spilogaster Boie.

Reported from Negros by Boulenger; I have seen no specimen of this species from Negros.

Natrix dendrophiops negrosensis subsp. nov.

Type.—No. 128, E. H. T. collection. Canlaon Volcano, Occidental Negros, P. I. E. H. Taylor, collector.

Description of type.—Rostral fairly large, nearly twice as wide as high, upper edge curved and distinctly visible from

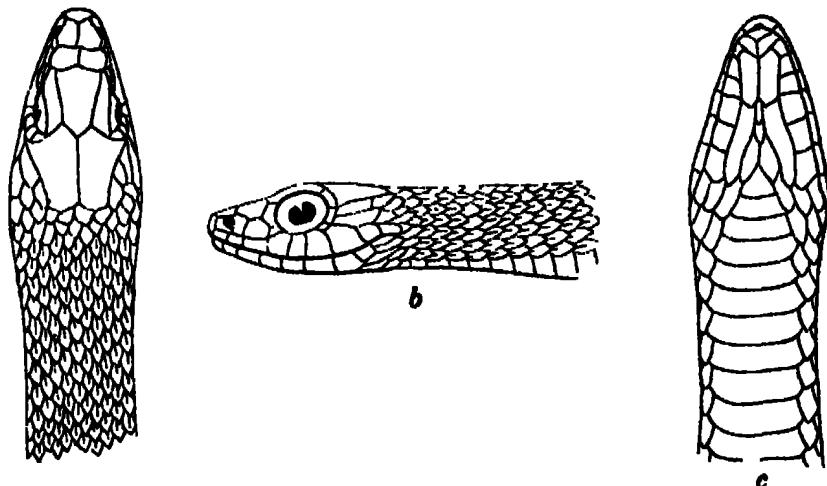


FIG. 1. *Natrix dendrophiops negrosensis* subsp. nov., head; a, top; b, side; c, underside.

above; its sutures with nasal little longer than those with internasals; the latter longer than broad, the suture between them equals their sutures with prefrontals, which is less than that with nasals; prefrontals much broader than long, narrowed on the sides, forming coequal sutures with internasal and frontal, the shortest suture with the supra-ocular; frontal longer than broad, wider, but not as long as supra-oculars, somewhat shield-shaped, longer than its distance from the end of snout, shorter than parietals; the latter longer than broad, bordered laterally by two elongate temporals, in contact with only one postocular; nostril between two nasals, which differ greatly in shape, but are of nearly the same size; loreal nearly square, touching second and third labials; one elongate preocular, twice as high as wide, and

wider at the top than at the bottom, semidivided; three small postoculars (four on right side); temporals 2 + 3; fourth, fifth, and sixth labials entering eye; mental broadly triangular; ten lower labials, sixth and seventh largest; first five in contact with the first chin shield, which is noticeably shorter than the second. Nineteen rows of scales; the outer largest, faintly keeled, all the others strongly keeled; scales with two apical pits easily discernible; anal divided; ventrals, 164; subcaudals, 97. Eye very large.

Color in life.—Reddish brown to olive, with a median series of dark, more or less distinct, spots or bars at intervals of 0.5 centimeter; on the sides and as continuations of the dark bars is a series of dark spots continuous vertically with the others. Below pinkish white with a series of small, more or less regular, black spots on each ventral and subcaudal. Bars on the neck very much wider than elsewhere. Top of head brownish olive. Labials brownish white with dark areas between the first three labials; a distinct black line runs from behind eye to posterior part of eighth supralabial, where it turns and continues downward to the first ventrals. Scales on the head minutely edged with black.

Measurements of the type of Natrix dendrophiops negrosensis subsp. nov.

	mm.
Length	730
Snout to vent	526
Vent to tip of tail	204
Width of head	11
Length of head	20
Diameter of eye	5

Variation.—The postoculars show a tendency to increase to four; one specimen has the third, fourth, and fifth labials entering the eye, and a second specimen shows four labials entering on the right side.

Remarks.—The following characteristics seem to warrant the separation of this subspecies from typical *Natrix dendrophiops*. There is a tendency to increase the number of postoculars from 3 to 4. There is only a single preocular. Specimens of *N. dendrophiops*, from northern Mindanao, have 2 distinct preoculars;¹ there is an average of 10 more ventrals and there are constantly 19 instead of 17 rows of scales. The eye is somewhat smaller, and the loreal is lower.

¹ Only one in the type, see Günther, *Ann & Mag. Nat. Hist.* (1883), V, 11, 186, fig.

TABLE I.—*Natix dendrophope negrosensis* subsp. nov.

No.	Locality.	Collector.	Sex or age.	Length	Tail.	Ven- tral.	Sub- can- dala.	Preco- cervi- lare	Pecto- cervi- lare	Scale rev.	Tempo- ral.	Labels enter- ing esp.	Collection.
125	Mount Canlaon, Occidental Negros	E. H. Taylor	yr.	315	77	169	98	1	4-3	19	2-3	3-4-5	E. H. Taylor.
126	do	do	do	625	170	165	97	1	4	19	2-3	4-5-6	Do.
127	Isabela, Occidental Negros	do	yr.	460	128	162	91	1	3	19	2-3	4-5-6	Do.
128	Mount Canlaon, Occidental Negros	do	d'	730	204	164	97	1	4	19	2-3	4-5-6	Do.

Cyclocorus lineatus Reinhardt.

More than twenty specimens were captured on the volcano; many others seen were not taken. A single young specimen killed by Mr. McNamara is the only specimen obtained from the lowlands.

The following differences in scalation are noted between the Negros and Mindanao forms. In the former an average of 15 more ventrals and 4 less subcaudals is found in the males; in the females there are 8 more ventrals and 4 less subcaudals than are found in Mindanao specimens. The number of labials touching the chin shields in Negros specimens is 4 to 5; in Mindanao specimens, 3 to 4, the larger percentage having 3. Three specimens have the anterior part of the body decidedly coppery red to maroon.

Ophites aulicus Linnaeus.

Nine specimens were taken by Mr. McNamara. A dead specimen seen at Isabela was not preserved.

Dendrophis pictus Gmelin.

Common in the lowlands of the island, but I have not found it in the mountains. The several specimens in the collection are from Isabela, Hinigaran, Bacolod, and La Carlota.

Oligodon modestus Günther.

I have not seen this snake. The type is from southern Negros.

Elaphe erythra Dumeril and Bibron.

Common in the lowlands. Specimens were taken at Hinigaran and Isabela; three were taken by Mr. McNamara at La Carlota. All of these specimens have blackish tails, but otherwise agree with the same species from other islands.

Gonyosoma oxycephalum Boie.

A single specimen in the Bureau of Science collection was taken at Dumaguete by Mr. Eskridge, of Silliman Institute.

Dendrelaphis modestus Boulenger.³

³ *Dendrelaphis fuliginosus* Griffin.—An examination of the type of this species convinces me that it is a specimen of *D. modestus*. The color on which the species seems to have been based appears to have been caused by some preserving fluid, since the flesh and the intestines are likewise discolored. The type has a few more ventrals and subcaudals than the type of *D. modestus*, but no other difference worthy of mention could be found.

Two specimens of this species were found—one by Mr. McNamara at La Carlota, the other by myself in the mountains near Isabela.

Dendrelaphis terrificus Peters.

It appears that *Dendrelaphis caeruleatus* Griffin is a discolored specimen of this species.⁴ A careful comparison of the type with specimens of *D. terrificus*, from Mindanao, reveals no differences in scalation. One specimen in the Bureau of Science collection is from Negros.

Calamaria gervaisii iridescoens subsp. nov.

Type.—No. 201, E. H. T. collection. Canlaon Volcano, Occidental Negros, P. I.; elevation about 900 meters. E. H. Taylor, collector.

Adult female.—Rostral a little deeper than broad, the part visible above equal to the suture between prefrontals; internasals absent; prefrontal very large, about as broad as long, touching two labials laterally; loreal absent; frontal much longer than its distance from the end of snout, twice as wide as supraoculars, shorter and not as wide as parietals; nostril pierced in a minute nasal; latter fan-shaped; one preocular, very small; supra-ocular scarcely twice as long as wide; one small postocular; five upper labials, last largest, third and fourth entering eye; an elongate posterior temporal behind the fifth labial, bordering the parietal; mental as deep as wide, touching the chin shields; three labials touch the first pair of chin shields, which are much larger and slightly wider than the second pair; scales in 15 rows; ventrals, 178; subcaudals, 14; anal single; total length, 306 millimeters; tail, 14.

Color in life.—Dark iridescent brown above, with a very indistinct series of four darker lines, each minutely powdered with a lighter color. Series of white dots begin on the outer row of scales and continue regularly to the base of tail. A second row of dots begins on the second row of scales, but continues only a short distance. Top of head mottled with dark brown, the labials almost covered with yellowish white. Lower labials and scales on neck and chin yellow, with brown maculations. Ventrals barred across belly with blackish brown and canary-

⁴ The color on which Griffin's species appears to have been founded seems to be the result of the specimens having been preserved in formalin, since specimens of the species of *Dendrelaphis*, *Dryophis*, and *Crysopalea* turn this blue and lose almost all their original markings and color when preserved in formalin.

TABLE II.—*Calamaria gervaisii tridescens* subsp. nov.

No.	Locality.	Collector.	Sex.	Length.	Tail.	Vent.	Sub-	Locali-
197	Mount Canicas, Occidental Negros	H. H. Taylor	—	mm.	mm.	mm.	mm.	mm.
198	do	do	♂	112	7.5	10	14	15
199	do	do	♂	180	10	17.5	14	15
201	do	do	♂	805	14	17.5	14	15
202	do	do	♂	240	16.5	15.5	15	15
203	do	do	♂	205	17	15.5	15	15
204	do	do	♂	115	8	15.5	15	15
205	Isabela, Occidental Negros	H. H. Taylor	—					
206	do	do	—					

yellow bars, less heavy in front of anus; underside of tail with a median dark line.

Variation.—Five specimens taken agree very well, save that the barring on the belly is much less distinct in very young specimens.

It will be observed that the females have more ventrals and less subcaudals than the males.

Remarks.—It seems that the separation of this form is well justified.⁵ The females have an average of 13 more ventrals and 1 more subcaudal than the average of 20 specimens available for counts from other parts of the Islands. The males have an average of 8 more ventrals and 1 more subcaudal than 12 males available for counts from other islands. Moreover the species grows to a larger size than the typical form, and the eye is larger.

Genus *PSEUDORHABDIUM* Jan

Rabdion, part., DUMERIL and BIBRON, Mém. Acad. Sci. (1853), 23, 441; Erp. Gén. (1854), 7, 115.

Pseudorabdion JAN, Arch. Zool. Anat. Phys. (1862), 2, 10.

Oxycalamus GUNTHER, Rept. Brit. Ind. (1864), 199.

Pseudorhabdium BOULENGER, Cat. Snakes Brit. Mus. (1894), 2, 328.

Maxillary teeth, 10 to 12, subequal; anterior mandibular teeth slightly longer than the posterior. Head not distinct from neck; eye small, with round pupil; nostril pierced in a minute nasal; internasals small; loreal present or absent; preocular small or absent; no temporals, parietals in contact with labials. Body cylindrical; scales smooth, without apical pits, in 15 rows; ventrals rounded. Tail short; subcaudals in 2 rows. Malay Peninsula and Archipelago. Three species of this genus are known, and all of them are found in the Philippines.

Key to the species of *Pseudorhabdium*.

a¹. No loreal present.

- b¹. Frontal longer than broad. Preocular usually present. Supraocular small *longiceps* Cantor.
- b². Frontal little broader than long; supraoculars smaller still. Preocular wanting *oxycephalum* GÜNTHER.
- a². Loreal present. Frontal broader than long; no preocular.

menamara sp. nov.

* Boulenger lists a specimen from Negros having the anterior part of the body black ventrally; it is not at all improbable that this represents a specimen of this subspecies.

Pseudorhabdium monamare sp. nov.

Type.—No. 196, E. H. T. collection. Canlaon Volcano, Occidental Negros, P. I., December 24, 1915; elevation about 900 meters. E. H. Taylor, collector.

Description of type.—Rostral small, about as wide as high, a large part visible from above; internasals moderate, five-sided, sutures with nasal and prefrontal equal; forms its shortest suture with the loreal; prefrontals nearly three times as large as internasals, entering eye, touching frontal, loreal, internasal, and supra-ocular; longest suture with loreal, shortest with supra-ocular; frontal hexagonal, a little wider than long, sides touching supra-oculars shortest, parietal sides longest; parietals at least twice as long as wide, six-sided, in contact with fifth labial; nasal rectangular, much elongate, with nostril pierced near anterior edge close by the rostral; behind this a very much enlarged,

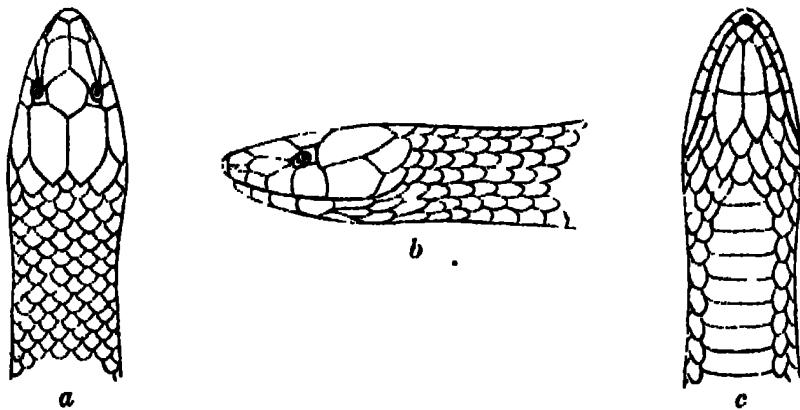


FIG. 2. *Pseudorhabdium monamare* sp. nov., head: a, top; b, side; c,

elongate, coffin-shaped loreal, in contact with second and third labials, entering eye; supra-ocular extending over only posterior part of eye and somewhat behind; postocular fused with supra-ocular; no anterior temporals; a single large posterior temporal lies behind fifth labial, bordering on the parietal; five upper labials, fifth largest, in the following order of size: 5, 3, 4, 2, 1; third and fourth enter eye; lower labials five; mental small, in contact with anterior chin shields, separating first labials; three labials touch anterior chin shield; second pair of chin shields slightly smaller; anal undivided; ventrals, 140; subcaudals, 22; eye very small; scales smooth, in 15 rows.

Color in life.—Above very shiny, more or less iridescent, dark blackish brown to bluish brown; about the neck is a more or less distinct yellow collar (dim or almost wanting in adults)

formed above by three or four small yellow spots; a cream-colored spot on the fifth upper labial; below canary to yellowish cream with a dark area on the outer edges of each ventral; latter ventrals mottled and subcaudals almost uniformly dark; occasional dark areas on the middle part of the ventrals.

Measurements of the type of Pseudorhabdium monamare sp. nov.

	mm.
Length	242
Snout to anus	220
Tail	21
Width of head	5.5
Width of body	5

Variation.—Males and females differ in the number of ventrals and subcaudals, the average for males being: ventrals, 131; subcaudals, 28; for females: ventrals, 142; subcaudals, 22. Four specimens show the postocular fused with the supra-ocular, and No. 197 has a preocular present. There is some variation in the relative length and width of the frontal. Some specimens have them equal and in one or two the length slightly exceeds the width. The females have the underside of the tail uniformly dark, while the males have it mottled and lighter; Nos. 192, 193, 194, and 195 have the second and the third lower labials fused, thus leaving only two labials touching the first chin shields.

Remarks.—Rather common at altitudes of 800 to 900 meters on the volcano. Specimens were not taken at a higher or a lower altitude. They were found under logs and rotting trash. They feed on earthworms and are in turn preyed upon by *Cyclocorus lineatus*, which is plentiful in the same locality. The females taken in December contained three undeveloped eggs.

I take pleasure in dedicating this species to Mr. Homer McNamara, superintendent of the La Carlota Agricultural Station, who rendered able assistance in making collections on the volcano.

This species represents a distinct section of the genus in having a loreal present. Specimens were usually found in pairs, a male and a female in the same place. (See Table III.)

Pseudorhabdium oxycephalum Günther.

There is a specimen in the British Museum from Negros. I have not been able to examine specimens of this diminutive snake.

Huria rhynchos Schneider.

Not uncommon along the coasts. Two specimens in the collection from Hinigaran.

TABLE III.—*Pseudorhabdion McNamarae* sp. nov.

No.	Locality.	Collector.	Sex or age.	Length	Tail.	Ven- tral scale data.	Sub- ven- tral scale data.	Posterior margin.	Posterior. Fins.	Collection.	H. H. Taylor.
188	Mount Canlaon, Occidental Negros	E. H. Taylor.	♀	188	37	163	22	22	0	Distinct	Do.
187	do	do	♂	180	36	184	22	22	0	do	Do.
188	do	do	♂	182	35	125	22	22	0	do	Do.
189	do	do	♂	187	32	125	22	22	0	do	Do.
190	do	do	♂	229	29	145	22	22	0	Fused	Do.
191	do	do	♂	206	39	142	22	22	0	Distinct	Do.
192	do	do	♂	212	35	145	22	22	0	do	Do.
193	do	do	♂	163	29	123	22	22	0	do	Do.
194	do	do	♂	173	30	120	22	22	0	Fused	Do.
195	do	do	♂	20	11	120	22	22	0	Distinct	Do.
196	do	H. McNamara	♀	262	21	140	22	22	0	Fused	Do.
197	do	H. H. Taylor	♀	269	20	140	22	22	1	do	Do.

Psalmodynastes pulverulentus Boie.

A specimen of this widely distributed species was taken on Mount Canlaon at an elevation of about 1,000 meters. It is very light yellowish brown, the ventral surface is canary. A second specimen from Negros is in the Bureau of Science collection.

Dryophis prasinus Boie.

A single specimen was taken in the foothills about Mount Canlaon. Probably not as common in Negros as in some other islands.

Boiga angulata Peters.

A single specimen in the Bureau of Science collection was taken by Dr. F. W. Foxworthy on Mount Marapara in Negros.

Lapemis hardwicki Gray.

Common along the coasts, where it is frequently taken in fish corrals. Several specimens in the collection from Hinigaran.

Crysopelea ornata Shaw.

Reported from Negros by Boulenger.

Trimeresurus wagleri alboviridis subsp. nov.

Type.—No. 432, young female, E. H. T. collection. Isabela, Occidental Negros, P. I., September 12, 1915. E. H. Taylor, collector.

Description of type.—Head triangular, very distinct from the neck, nearly 1.5 times as long as wide; rostral about as wide as high, not visible from above, bordered behind by two enlarged internasals; latter narrowly in contact, being nearly separated by three small scales; nasal bordered above by the internasal, two supranasals, and a postnasal folded over the canthus rostralis, the dorsal part much larger than the lateral; nasal large, longer than wide, nostril pierced near anterior margin, bordered behind by postnasal and seven or eight small intercalated scales, completely separating nasal from loreal and the latter from first labials; pit surrounded by the median preocular and two loreals; anterior loreal much larger than posterior, in contact with second labial and one supralabial; three preoculars, the middle one largest, the lower very small; two small subequal postoculars; a narrow, crescentic, elongate subocular, separated from the labials by a series of supralabials; supra-ocular region covered by four enlarged scales, supra-ocular somewhat longer than wide;

this is bordered by another scale along its inner side, nearly as large; a third somewhat smaller scale joins these behind and a fourth borders them in front; supra-ocular and the scale in front in contact with superior preocular; temporals subequal, about four lateral rows; upper labials 11 (10 on the right side); third and fourth largest; first and second subequal in size; 12 lower labials, only one in contact with anterior pair of chin shields; latter large, followed by 3 smaller pairs; head scales above strongly keeled, 14 to 15 rows between supra-ocular scales; scales in 23 rows, faintly keeled, with a slight notch indicated on each side of the scale; ventrals, 163; subcaudals, 50; anal entire.

Color in life.—Above bluish green, growing yellowish green laterally and greenish white below; body crossed with 26 very narrow white lines, not continuing ventrally; tail barred laterally with narrow white and blackish lines; point of tail whitish; a slight line behind eye to angle of jaw; top of head more blue than green, side of head lighter green with no markings. Length, 370 millimeters; tail, 62. Tail prehensile.

Remarks.—Only a single specimen has been collected. It was found in the low mountains of central Negros. I believe this to be the first specimen belonging to this genus taken in the island. Superficially it resembles the common *T. wagleri*, but differs sufficiently to warrant a separation from this species. The most important differences are as follows: It has 29 more ventrals than the average of 17 counts of Philippine specimens; the arrangement of the supra-ocular scales is quite different; a larger number of scales between the supra-oculars, which is five or six more than in the Philippine specimens of *T. wagleri*; the separation of nasal and loreal; the notching of the body scales that is evident in this form does not occur in the other forms of *T. wagleri*.

LIZARDS

Gymnodactylus philippinus Steindachner.

Four specimens were taken in the low mountains near Isabela. They vary in the distinctness of the transverse bars on the back. All of them are females and were found under logs or flat rocks.

Gekko gecko Linnaeus.

Very common in the lowlands, where it can be found in practically all houses. Almost every clump of bamboo is inhabited

by one or more individuals. I obtained it also in the low mountains at Isabela, but not on Mount Canlaon save at its base. I doubt if this species is found above an altitude of 500 meters in the Islands. There are 22 specimens in the collection.

Gekko monarchus Dumeril and Bibron.

A single specimen taken in the mountains near Isabela has been referred to this species. It is an immature female. The spots on the back are blurred, not distinct as in other specimens examined. However, I do not doubt that it is correctly placed with this species.

Hemidactylus frenatus Dumeril and Bibron.

This species is very common in the lowlands, but probably does not ascend to any great altitude. It is found under rocks on the cogon-covered hills on the central-western coast. This species is the only one of the four common house geckos that I have found in such a habitat, the others preferring houses and trees. However, this species is also very common in houses. Numerous specimens were taken.

Peropos mutilatus Weigmann.

Common in houses everywhere in the lowlands. Two specimens taken at Isabela in the mountains were distinctly spotted with dark brown over the ventral surface of body and tail, with a whitish line through the eye; these markings are wanting in other specimens. One specimen from Mindoro resembles these. It is not improbable that they represent a distinct variation. Numerous specimens in the collection.

Lepidodactylus christiani sp. nov. Plate II, fig. 1.

Type.—No. 900, E. H. T. collection. Mount Canlaon, December 28, 1915; elevation about 700 meters. E. H. Taylor, collector.

Description of type.—Head not distinct from neck (probably due to abnormal deposits of calcareous matter under the skin of the neck on both sides); snout rather long, almost twice diameter of eye; distance from nostril to eye equal or minutely longer than distance from eye to auricular opening. (Auricular opening on the left side abnormally wanting, due to calcareous deposits.) Rostral more than twice as wide as long, its upper margin irregular; nostril bordered by the first labial, a large postnasal, which is in contact with two labials and three supranasals (four on the right side), the supranasals completely separate the rostral from the nostril; these scales form a rounded

prominence about the nostril; anterior supranasal in contact with first labial; between the nasals, immediately behind rostral, are three rather enlarged, rounded scales, and a small, probably anomalous, scale; 18 or 14 upper labials, last two very small; angle of mouth without differentiated labial scales; two superimposed, enlarged scales behind postnasal, followed by a row of irregularly enlarged scales bordering labials; 11 lower labials, a row of small rounded scales bordering lower labials, those touching mental smallest, two or three rows of smaller scales bordering these; scales on forehead tubercular, much larger than those on body; ear opening small, its greatest diameter equal to one third or one fourth the diameter of eye, nearer the eye than the foreleg; eye large, pupil vertical; dorsal and lateral scales tubercular, minute; ventrally, scales rounded, somewhat imbricate, and larger.

A long continuous line of 26 enlarged scales in preanal and femoral region, the 9 median largest, in a somewhat curved line, some of the scales apparently perforated with small pores. It is probable that the 9 enlarged scales (not improbably the entire 26) represent the number of pores in the male. A few rows of enlarged scales behind this row in front of anus. Tail much flattened, especially below, bordered on the sides by a broad denticulate fringe, the annulations, scarcely distinguishable; scales below rounding and distinctly larger than those above. Tip of tail regenerated; this has the fringed edge, but the serrations are smaller and scales above and below are not arranged regularly. Foreleg pressed forward reaches anterior border of eye; no distal joint on inner digits, others with clawed distal joints rising from near the broadened extremity of digit; lamella on the broadened portion of digits divided by a median groove; strongly denticulate on outer edge; these divided lamellæ followed by undivided scalelike lamellæ, decreasing in width; fourth toe with 8 or 9 lamellæ, the first four divided; digits of both limbs with webs, a slight web behind the hind leg.

Color.—Above ashy gray to blackish brown on back and sides of arms and tail; snout darker, with a dark line passing through the lower part of eye to shoulder; below lighter, flecked with brown and with traces of yellow; ventral side of tail more or less reddish. The specimen was taken alive just at twilight. Then it appeared to have a series of large well-defined markings above and appeared yellow or white below. As it was necessary to preserve the specimen at once, the colors of the living animal were not observed by daylight.

Measurements of *Lepidodactylus christiani* sp. nov.

	mm.
Length, tail partially regenerated	83
Snout to vent	43
Hind leg	15
Fore leg	12
Width of head	8.5
Greatest body width	11
Greatest tail width	8

Remarks.—I take pleasure in dedicating this species to Lieut. Ralph L. Christian, U. S. Army, who accompanied an expedition to Canlaon and assisted in making collections. The unique specimen of this species was found in a large mass of fern and other roots cut from its resting place in a tree about 8 meters from the ground. This mass was being searched for arboreal Typhlopidae common in such habitats in Mindanao. Although no species of *Typhlops* was found, this species and a new species of *Siaphos* were discovered. Four species of this genus have been described from the Philippines. They are characterized and differentiated by the following key:

Key to the Philippine species of *Lepidodactylus*.

- a'. Rostral enters nostril.
- b'. Fourteen upper, 15 lower labials; no femoral pores, 9 preanal pores on each side forming a doubly arched series, angular medially.
L. labialis Peters.
- b'. Thirteen to 14 upper labials, 12 to 13 lower; an unbroken angular series of 12 preanal pores, 6 on each side..... L. brevipes Boettger.
- b'. Twelve upper, 11 lower labials (Description of type does not mention pores)..... L. planicaudus Stejneger.
- b'. Eleven upper, 10 lower labials; preanal and femoral pores arranged in a continuous series angular medially, 19 on each side.
L. aurilucatus Taylor.
- c'. Rostral separated from nostril. Tail flattened with broad denticulate fringe; scales surrounding nostril forming a raised prominence.
L. christiani sp. nov.

Cosymbotus platyrurus Schneider.

Very common in the houses. It is probably seen more frequently than the five other house lizards. I have never found this species in the forest away from human habitation.

Draco ornatus Gray.

Reported from Negros by Boulenger. I have examined no specimen from this island.

Draco spilopterus Weigmann.

Reported from Negros by Boulenger. No specimen has been taken by me.

Hydrosaurus pustulosus Eschscholtz.

Many of these lizards have been observed, but only two specimens are present in the collection, both captured by Mr. McNamara at La Granja. They agree very well with specimens from Mindoro, but the dorsal scales seem larger than those from Polillo, and there are several more femoral pores on each side.

Calotes marmoratus Gray.

A single specimen of what appears to be this species was collected in Negros by Mr. W. Schultze, who presented it to me. It had been preserved in formalin and is brown with black spots and lines. The specimen is halfgrown, with a small dorsal crest.

Gonyocephalus sophiae Gray.

There is a single specimen in the collection of the Bureau of Science, which was collected by Mr. C. S. Banks. It is an adult male, with the nuchal and dorsal crests well developed and continuous. A specimen of what appeared to be this species was observed near Isabela, but it escaped before capture was possible.

Varanus nuchalis Günther.

There are four specimens in the collection. Three were taken by myself at Hinigaran, and the fourth by Mr. McNamara at La Granja. One specimen from the eastern coast of the island was uniformly dark, having no yellow spots. This species is very common about the cane fields and ascends some distance into the mountains.

Mabuya multicarinata Gray.

This species is abundant in Negros. It ascends more than halfway to the summit of Canlaon. There are several specimens in the collection.

Mabuya multifasciata Kuhl.

Common in Negros, where it grows to a more robust size than was found in Mindanao. The males and the females are distinctly different in coloration. The male is uniform bluish green, with an orange lateral spot during the breeding season; above the female is brown, with each scale black-edged, forming indistinct longitudinal lines; laterally, dark with numerous black-edged, greenish white ocelli.

Sphenomorphus jagori Peters.

Two specimens were taken on Canlaon: one young, one adult. The latter is much larger than specimens of *S. jagori* found elsewhere in the Islands. Laterally there is a series of 12 irregular black spots, which mark the termination of the indistinct dorsal reticulations. The broad elongate black stripe is present above the hind leg. There are 44 scale rows around the body, which is 5 or 6 rows more than in specimens from Mindanao. This may have to be considered a distinct subspecies. The markings on the young specimen are but little more distinct than in the adult. Total length of largest specimen, 270 millimeters; snout to vent, 106; foreleg, 31; hind leg, 44; axilla to groin, 55; head to insertion of foreleg, 42; snout to ear opening, 20; width of head, 18; width of body, 20. In the adult specimen the first supra-ocular is divided, making 5 large supra-oculars, 3 touching the frontal.

Sphenomorphus steerei Stejneger.

I have referred to this species the small *Sphenomorphus* found commonly in the mountains of Negros. In scalation it appears identical, but the proportions of the body are different. I have at hand specimens from the small island of Guimaras, the type locality. These likewise differ greatly in proportions, but agree in the scalation of the head. It seems hardly probable that two closely related species occur on Guimaras. It is probable that the type is an immature specimen. I append a table, giving the measurements of three specimens of this species.

TABLE V.—*Measurements of Sphenomorphus steerei Stejneger.*

	Type, Guimaras, 1901, U. S. National Museum.	No. 908, Guimaras, E. H. Taylor collection.	No. 909, Negros, E. H. Taylor collection.
Length	47	66	74
Tip of snout to vent	24	22	28
Vent to end of tail	28	27	41
Snout to foreleg	12	11	18
Axilla to groin	11(?)	17	20
Foreleg	6	5.5	6.5
Hind leg	10	9	10
Width of head	4.5	4	5
Eye nearer foreleg than snout	yes	no	yes

* *Sphenomorphus fasciatus* (Gray).—Reported by Casto de Elera from Negros. I believe this to be a doubtful record.

The color above is dark brown with markings similar to those of *S. steerii*. Specimens from Canlaon have canary-yellow bellies, and the males have a large rose pink spot on the neck, which disappears in alcohol. The species is very common.'

Dasia amaragdinum Lesson.

Represented by a single immature specimen. It is grayish olive above with small white spots and a few darker spots mixed with the white spots on the neck. This species does not appear to be rare, as many specimens were seen in the tall forest trees.

Sphenomorphus arborens sp. nov. Plate I.

Type.—No. 418, E. H. T. collection. Mount Canlaon, Occidental Negros, P. I., December 20, 1915. E. H. Taylor, collector.

Adult male.—Head short and blunt, rostral bent backward over snout, forming a curved suture with frontonasal; latter much wider than deep, in contact with first frenal; no supranasals; prefrontals very large, broadly in contact; frontal triangular, its broadest part anterior to first supra-ocular; in contact with three supra-oculars; frontoparietals distinct, broadly in contact, elongate, touching three supra-oculars; parietals large, forming a suture behind interparietal, which is narrow and elongate; nasal large, pierced by a rather large nostril; two frenals, the first higher and narrower than the second, which is larger than first; two preocular scales superimposed, the lower much the larger; two or three rows of scales between labials and orbit; ten superciliaries, the first especially large, in contact with the frontal; five supra-oculars, last very small (can scarcely be considered a supra-ocular); lower eyelid covered by two rows of scales, the upper small, the second row elongate, enlarged, eleven or twelve in number; small postoculars; five temporals, that bordering the parietal very large; ear large, about half the diameter of eye; six upper labials, fourth and fifth below eye; fifth largest; lower labials four or five, very narrow and elongate; mental moderate, first postmental more than twice as deep; four pairs of chin shields, first pair in contact, second pair separated by one scale, third pair by three scales; fourth pair broken in two; 40 to 42 scale rows

¹ It is obvious that a more detailed study of these small shanks is needed. I have before me specimens from Palawan, Mindoro, and Mindanao, which apparently are different from described species. Yet they vary considerably among themselves. A study of these small forms has been begun.

about the body, laterally they are arranged in vertical rows; two enlarged preanals, with enlarged scales in front of them; 21 rounding lamellæ under fourth toe. The adpressed hind leg fails to reach the axilla, but reaches to near elbow of adpressed foreleg. The ear is slightly nearer the foreleg than end of snout.

Color in life.—Above brown, variegated with lighter and darker scales, and a median row of irregular dim dark spots; a lateral stripe, beginning on the point of the nose, widening behind ear, continues as a wide broken line of dark irregular spots to some distance on the tail; labials and chin muddy white with a bluish tinge; belly with a wash of canary; tail spotted below; spots on the preanal scales.

Measurements of the type of Sphenomorphus arboreus sp. nov.

	mm.
Length	168
Snout to vent	65
Vent to end of tail	108
Snout to foreleg	25
Axilla to groin	32
Width of head	9
Width of body	10
Foreleg	20
Hind leg	28

Variation.—The collection contains six adult specimens and seven young, all taken on Mount Canlaon. There is a slight amount of variation in the width of the frontal and in its relation with the first superciliary. Several of the specimens have the neck and the throat a dark muddy color, with a bluish tinge; young colored like the adult.

Remarks.—This species superficially resembles *Sphenomorphus variegatum* Peters, but differs in a number of essential points. There are fewer supra-oculars, the scales on the foot and especially the heel, are larger; the first frenal is high and is not superimposed above another. The hind leg is much shorter, and does not reach the axilla. In *S. variegatum* the hind leg reaches halfway between the foreleg and ear. It is common on Canlaon at an elevation of 800 to 1,200 meters; it is strictly arboreal and is seldom seen on the ground.

Leiolepisma pulchellum grande subsp. nov.

Type.—No. 899, E. H. T. collection. Canlaon Volcano, Negros, P. I.; December 22, 1915; elevation 900 meters. E. H. Taylor, collector.

TABLE V.—*Sphenomorphus arboreus* sp. nov.

No.	Locality.	Collector.	Length. mm.	Snout to vent. mm.	Vent to short end of tail. mm.	Front to hind limb. mm.	Hind limb. mm.	M. H. Taylor.
400	Cebu Volcan, Negros	M. H. Taylor	—	—	—	—	—	—
401	do	do	34	24	19.5	12	10	Da.
402	do	do	34	24	19.5	12	10	Da.
403	do	do	34	24	19.5	12	10	Da.
404	do	do	34	24	19.5	12	10	Da.
405	do	do	34	24	19.5	12	10	Da.
406	do	do	34	24	19.5	12	10	Da.
407	do	do	34	24	19.5	12	10	Da.
408	do	do	34	24	19.5	12	10	Da.
409	do	do	34	24	19.5	12	10	Da.
410	do	do	34	24	19.5	12	10	Da.
411	do	do	34	24	19.5	12	10	Da.
412	do	do	34	24	19.5	12	10	Da.
413	do	do	34	24	19.5	12	10	Da.
414	do	do	34	24	19.5	12	10	Da.
415	do	do	34	24	19.5	12	10	Da.

* Not listed.

* Tail represented.

Description.—Head less pointed than *L. pulchellum* and not narrowed and flattened so abruptly in front of eyes; distance between nasals proportionally less; rostral broadly visible above, length above much greater than height of snout; frontonasal large, not rectangular, but distinctly rounding in front; prefrontals almost as large as frontonasal, forming a median suture about one third of their greatest length; frontal twice as long as wide, narrowed to a long point behind; frontoparietals distinct, their suture much larger than in *L. pulchellum*. Parietals moderate, inclosing an elongate interparietal; nasal large, pierced by the nostril; no supranasals, first frenal distinctly higher than nasal, higher but much smaller than second frenal; two preoculars, the lower largest; nine superciliaries, none in contact with frontal; six supra-oculars, the last as wide as the first; third widest; four in contact with frontal; seven upper labials, the first three elongate, of nearly equal size and shape; last four higher; a scale partly inserted between fourth and fifth and fifth and sixth labials; five or six enlarged temporals. Lower eyelid with an undivided transparent disk; auricular opening two thirds as large as eye; six lower labials, all narrow and elongate; two undivided postmentals, the first small (the small one absent in the cotype); two very much enlarged preanals, which are preceded by three or four enlarged body scales; 25 lamellae under fourth toe; 22 scale rows about the body; three or four pair of nuchals present.

Color in life.—Dark, mottled brown above with a greenish bronze dorsal streak; dark spots on the parietal region; supra-oculars each with an indistinct lighter line; labials with dark spots, laterally flecked with bronze-greenish light spots; chin, throat, belly, and underside of tail immaculate, iridescent greenish with a wash of bright canary. Legs spotted with minute lighter areas. Tail above spotted with brownish, with a trace of a median lighter streak.

Measurements of the type of Leiolepisma pulchellum grande subsp. nov.

	mm.
Length, end of tail lost	67
Snout to vent	42
Snout to ear	10
Snout to insertion of arm	18
Axilla to groin	22
Foreleg	15
Hind leg	19
Width of head	0.85

The foreleg reaches forward to the nostril; the hind leg fails to reach the axilla by a considerable distance.

Variation.—The cotype varies in not having the frontal narrowed so quickly as the type and the interparietal shorter.

Remarks.—This form differs from *L. pulchellum* in the larger number of supra-oculars; the shape of the head; the shorter hind leg, which does not reach the axilla; the frontal touches four instead of three supra-oculars; the interparietal is very much smaller and narrower than the frontal; two scale rows less around the body. It obviously grows to a larger size. I have ten typical specimens of *L. pulchellum* for comparison. They are invariably shorter, the heads narrower, the median streak brilliant golden yellow, and the tail brownish yellow with the markings almost totally disappearing.

Only two specimens of the present subspecies were taken, these in the same immediate locality on Mount Canlaon.

Siaphos suriculatum sp. nov. Plate II, fig. 2.

Type.—No. 894, E. H. T. collection. Canlaon Volcano, Negros, P. I.; December 23, 1915; elevation 900 meters. E. H. Taylor, collector.

Description.—Rostral large, covering the end of the conical snout, forming a broad suture with the frontonasal, about equal to that with the nasals; frontonasal very large, convex anteriorly and concave behind, forming its largest suture with frontal; latter rather triangular in shape, longer than broad, anterior part rounding, not as wide as supra-ocular region; frontoparietals fused into a single large scale, which is distinctly wider than supra-ocular region, in contact with three supra-oculars; interparietal as wide as frontal, but shorter; parietals elongate, diagonal, more than twice as long as wide, joined behind the interparietal, in contact anteriorly with two very small postoculars; three or four pairs of enlarged nuchals; nostril pierced in the middle of the single nasal, which is followed by two frenals subequal in size, as high as the nasal; two superimposed preoculars; eight superciliaries, anterior largest; four supra-oculars, two touching the frontal, second widest; two pairs of slightly enlarged postoculars and a row of scales above the upper labials; a rather enlarged scale between fourth and fifth upper labials; eight upper labials, fifth and sixth largest, below the eye; two greatly enlarged temporals with three or four others not so large; auricular opening comparatively large, a little more than half the diameter of eye; tympanum distinct, not

covered with scales, not deeply sunk; six or seven lower labials; mental rather large, followed by a large undivided postmental, which is followed by three pairs of chin shields; the first in contact, the second separated by a single scale, the third pair separated by three scales and followed by one enlarged scale; scales in 24 rows around body, the two median greatly enlarged; two enlarged anals; the fourth toe slightly longer than third; adpressed limbs fail to meet; 20 lamellae under fourth toe; lower eyelid with an undivided transparent disk.

Color in life.—Above grayish brown with a median stripe of dark brown, covering part of the two median scale rows, continuing as a dotted stripe on the tail, dim on the neck; a dark brown stripe begins behind the eye and continues laterally to near end of tail, this does not involve the ear and is about three scales wide on the sides; it grows dimmer on the tail; head grayish brown with irregular darker markings, laterally quite dark with a lighter area on each labial; below rather dirty whitish; fingers and toes barred with blackish brown.

Measurements of the type of Siaphos auriculatum sp. nov.

	mm.
Length	97
Snout to vent	43
Axilla to groin	24
Snout to foreleg	17
Foreleg	8.5
Hind leg	14
Width of head	6
Width of body	7

Variation.—Two other specimens were obtained in the same locality. Each has 22 rows of scales around the body. In No. 893 the interparietal is partially fused with the parietal. The median stripe is very dim and the color is iridescent olive-brown with suggestions of a narrow greenish line just above the lateral brown stripe. In No. 895 the stripe appears as a double row of dots. It is the largest specimen, and measures 47 millimeters from snout to vent.

Remarks.—This species has no close affinities. The absence of prefrontals, the size of the auricular opening and the tympanum free from scales are characteristics that clearly differentiate it from other members of the genus. Three specimens were taken in the type locality. It is an arboreal species.

Brachymeles gracilis Fischer.

Specimens were obtained both from Canlaon and Isabela. They agree fairly well with specimens from Mindoro, save that

the fourth labial enters the orbit, while most of those from Mindoro have the fifth entering the orbit. The character is not constant. Scale rows vary between 24 and 30. The sole specimen having 24 rows is from Isabela. Most of those from Canlaon have 28 scale rows. A single specimen taken on Canlaon, No. 397, varies markedly, and were the characters constant would represent a new species. The auricular opening is larger, the foreleg reaches the ear, while in other specimens it fails to reach the ear by nearly half its length; the fourth and fifth labials are below the eye, the hind leg is longer and thicker and is contained in the distance from axilla to groin 2.7 times. In all other specimens the hind leg is always contained more than three times in this distance. There are two well-defined light lines running from above the eye to some distance on the tail; from the ear to the hind leg the stripe is at least two scales wide. There are 30 rows of scales around the body.

Tropidophorus grayi Günther.

Common along the small mountain brooks near Isabela. Always found in the vicinity of water, usually under partly submerged stones or logs. A number of specimens in the collection.

Dibamus argenteus Taylor.*

Two specimens of what appear to be this species have been taken: one was found on Mount Canlaon; the other, near Isabela. Both differ from the type in having the color dark purple with silver blotches and in having seven instead of five scales bordering the interparietal. The eye is scarcely distinguishable; there are two instead of one postocular.

* In the original drawing of this species, *This Journal, Sec. D* (1915), 10, 89, Plate I, fig. 11, the interparietal is shown bordered by three scales. This is an error; five is the correct number. In the description, page 107, it is stated: "2 enlarged labials on each side extending farther back than the rostral;" this should read "2 enlarged lower labials, one on either side of the jaw extending farther back than the rostral."

ILLUSTRATIONS

[Drawings by P. Meekairu.]

PLATE I

Sphenomorphus arboreus sp. nov.; *a*, head, lateral view; *b*, head, dorsal view.

PLATE II

FIG. 1. *Lepidodactylus christiani* sp. nov.; *a*, head, lateral view; hind foot, ventral view.

2. *Siaphos auriculatum* sp. nov.; *a*, head, dorsal view.

TEXT FIGURES

FIG. 1. *Natrix dendrophiops negrensis* subsp. nov., head; *a*, dorsal view; *b*, lateral view; *c*, ventral view.

2. *Pseudorhabdium mcnamarae* sp. nov., head; *a*, dorsal view; *b*, lateral view; *c*, ventral view.

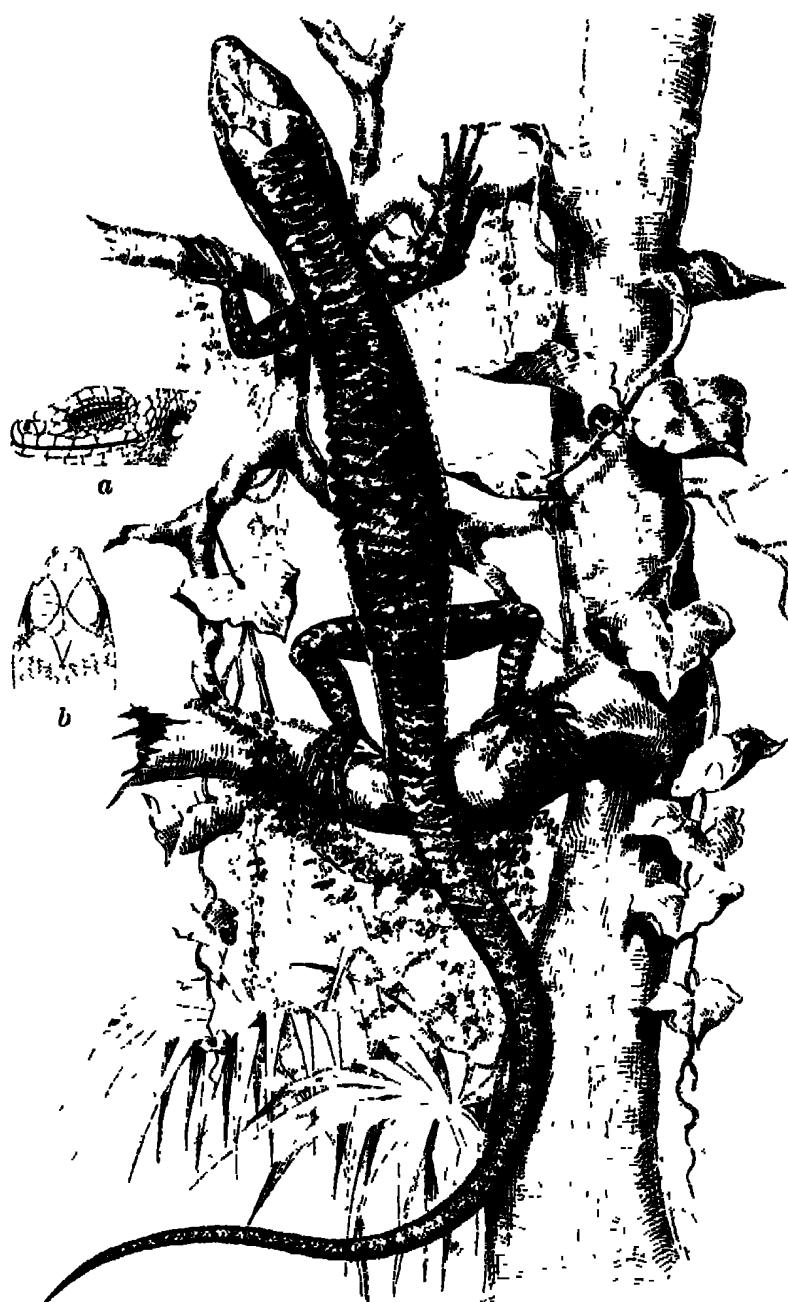


PLATE I. SPHENOMORPHUS ARBORENS SP. NOV.

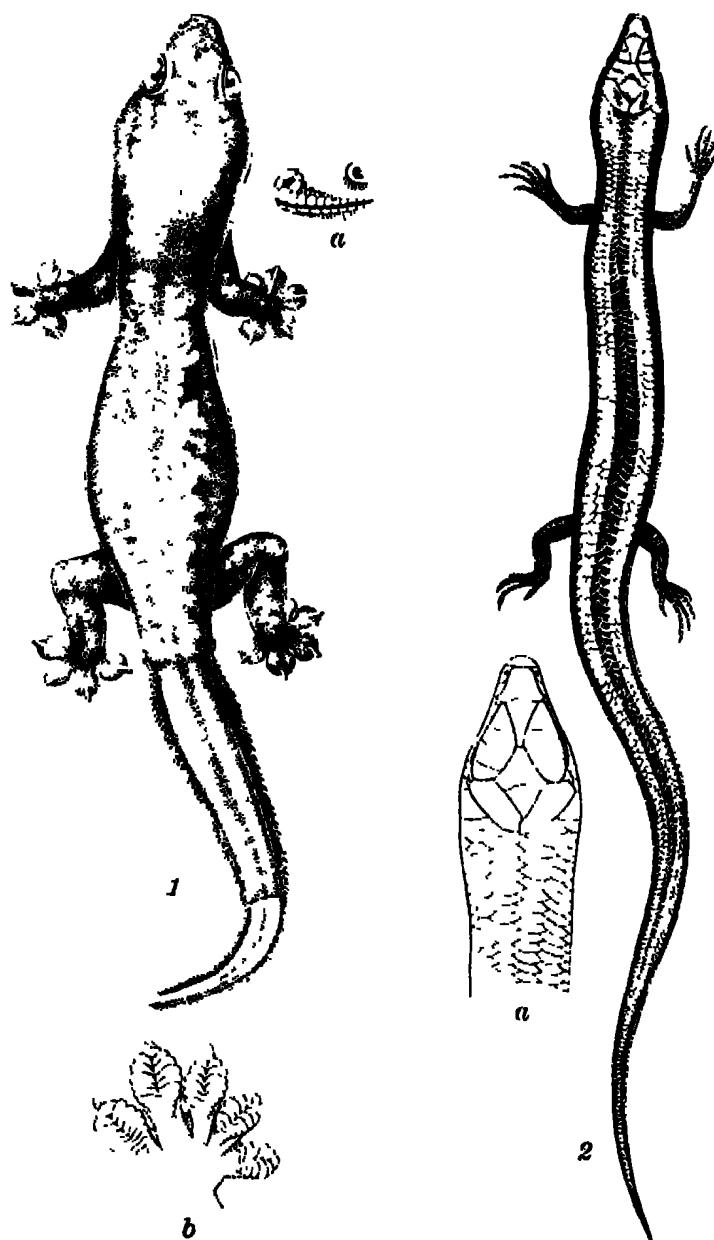


Fig. 1. *Lepidodactylus christianoi* sp. nov. 2 *Siaphos auriculatum* sp. nov.

ICHNEUMONOID PARASITES OF THE PHILIPPINES, II

RHOGADINAE (BRACONIDAE), II: THE GENUS RHOGAS

By C. F. BAKER

(*Les Baies, P. I.*)

Genus RHOGAS Nees

The Philippine species of this genus fall easily into three subgeneric groups. None of these corresponds exactly to any of the recognized European subgenera. The spurs of the hind tibia always fall considerably short of one third the length of the hind tibia, being short, straight, and pubescent in all of the species studied. In a single species, *Rhogas brownii* sp. nov., they are, in the female, a little longer than usual and slightly curved at the tips. In the Philippine material I have not encountered intermediates between the groups of eye forms, as described below, these being clearly marked and easily distinguished and characterized by other clearly correlated diagnostic features. In the lighter colored species the interocellar area is always piceous or black.

Synopsis of subgenera (Philippine species only).

- a'. Eyes large, very broadly elliptical, distinctly emarginate; malar space and cheeks relatively small; ocelli large.
 - b'. Radial cell of posterior wings not or very little broadened apically though often narrowed at middle; radial vein weak and decolorized or subobsolete; second cubital cell usually long; fourth hind tarsal joint slender; antennae unicolorous or slightly darker apically.
 - Aleiodes (Wesmael) Thomson.
 - b'. Radial cell of posterior wings strongly broadened apically, not narrowed at middle; radial vein distinct; second cubital cell usually short; legs stout, the fourth hind tarsal joint short and broad; antennae piceous to black, banded with yellowish. Rhogas Thomson.
 - c'. Eyes small, oval, subelliptical or round, little or not emarginate, relatively very large; ocelli small; legs with fourth hind tarsal joint slender; second cubital cell short. Aleirhogas subg. nov.

Subgenus Aleiodes (Wesmael) Thomson

Synopsis of the species.

- a'. Five tergites and, usually, part of the sixth abdominal tergite similarly sculptured; metanotum with a percurrent, median, sharp-rimmed, lanceolate furrow; second cubital cell twice or nearly twice as long as wide, the first transverse cubital vein very oblique; posteromedian mesonotal area with a longitudinal groove.

- b'. Ocelli large, distance from eyes about equal to the long diameter of an ocellus.
- c'. Disk of metanotum and part or all of the abdominal tergites black. *cameroni* sp. nov.
- c'. Unicolorous and stramineous..... *cameroni* var. *davisi* var. nov.
- b'. Ocelli very large, distance from eyes about one half the long diameter of an ocellus..... *pakwanensis* sp. nov.
- c'. Three, rarely four, abdominal tergites similarly sculptured; metanotum with a single median carina, distinct at least at base; second cubital cell usually less than twice as long as wide; posteromedian subdepressed area of mesonotum plane, regularly or irregularly rugose.
- c'. Four abdominal tergites similarly sculptured throughout; mesopleura strongly and very broadly depressed on posterior half. *benguetensis* sp. nov.
- c'. Three abdominal tergites only, similarly sculptured, the third frequently sculptured only at base.
- c'. First abscissa of radius less than one half the length of second; recurrent vein inserted a distance from second cubital cell equal to first abscissa of radius; thorax and abdomen laterally black-striped. *lateralis* sp. nov.
- c'. First abscissa of radius less than one half the length of second; recurrent vein inserted a distance from second cubital cell usually less than length of first abscissa of radius.
- f'. First abdominal tergite very short, little narrowed to base; length two thirds of apical width, the basal width subequal to length; no distinct median carina on third tergite; clypeus transverse, length not more than half the width; body ferruginous, first two tergites stramineous, no piceous markings. *subquadratus* sp. nov.
- f'. First tergite distinctly longer than broad at apex, more strongly narrowed to base.
- g'. Clypeus transverse, distinctly broader than long; second cubital cell very short, not narrowed apically; face transversely wrinkled; cheek very broad, nearly half diameter of eye; color stramineous, with piceous lateral stripes on body. *simillimus* sp. nov.
- g'. Clypeus as long as broad or longer; second cubital cell always much longer than wide and always more or less narrowed apically.
- h'. Median carina of third tergite becoming obsolete apically; metanotal carina complete.
- f'. Face shagreened; cheek narrow, about one fourth diameter of eye, outer margin parallel to eye margin, metapleural spiracle large, ovate; stramineous, the side of thorax and first tergite black-striped..... *mimicus* sp. nov.
- f'. Face more or less transversely wrinkled; metapleural spiracle small, circular.
- f'. Face transversely wrinkled only on upper half; antennae dark-colored, tergites piceous, remainder ferruginous.
- k'. Metanotum, piceous; fore and middle legs unicolorous; cheek nearly one half diameter of eye, its outer margin parallel to eye margin..... *bicolor* sp. nov.

- b.* Metanotum concolorous, "a spot at apex of middle and hind femora, more or less of the base and apex of hind tibiae, and the hind tarsi black."
melanoscma Ashm.*
- f.* Face nearly all transversely wrinkled; antennae pale; abdomen stramineous, excepting borders of first tergite; cheek distinctly narrower above than below where it is one third diameter of eye..... *modestus* sp. nov.
- A.* Median carina of third tergite sharply distinct throughout; cheek with outer margin parallel to eye margin.
- F.* Metanotal carina complete; face shagreened below, transversely wrinkled above; metapleural spiracle circular; vertex back of eyes long and very strongly narrowed.
separatus sp. nov.
- F.* Metanotal carina incomplete; face all shagreened; metapleural spiracle ovate; vertex back of eyes short and very broad *banksi* sp. nov.

* The position of this species is very uncertain.

Rhogas (Aclodes) cameroni sp. nov.

Stramineous; antennae piceous, paler apically; vertex piceous, side margins paler; face faintly and irregularly clouded with piceous; dorsum of thorax, except sutures and median metanotal groove, piceous; upper and lower borders of propleura and a mark on mesopleura below wings piceous; dorsum of abdomen, except first and third to sixth sutures and lateral margins, piceous to black. Legs with femora apically, tibiae, tarsi, and hind coxae more or less stained with piceous. Lower half of hypopygium piceous. Wings faintly smoky, stigma and veins pale brown.

Female, length, 6.5 millimeters.

Head viewed from above thick transverse, with eyes large and bulging, distance between them subequal to distance from occipital carina to front margin of anterior ocellus; vertex somewhat depressed about ocellar area, surface smooth and shining; vertex strongly narrowed back of eyes, occipital carina long and gently incurved; length of vertex back of ocelli subequal to length of exposed cheek margin and to length of ocellar area; ocelli large, distance from ocelli to eyes slightly less than twice interocellar distance and subequal to the long diameter of an ocellus, anterior ocellus slightly farther removed.

Face to mouth longer than wide, slightly wider above due to emargination of eyes, shallow and irregularly rugose-punctate, clypeus smooth; a subobsolete median carina just below antennae; mouth opening large and transversely long-elliptical; clypeus large and broad, twice as broad as long, basal margin somewhat

more curved than apical, surface laterally concave; clypeal pits distant from eyes two and one-half times their diameter. Head viewed from side with prominent, evenly curved face margin, clypeus not projecting; cheeks narrow, about one third the width of eyes, outer margin parallel with eye margin; malar space small, its length subequal to width of cheek; eyes very large, very broadly and bluntly elliptical. Maxillary palpi reaching tegulae, third joint longest, somewhat widened at middle, fourth shorter and somewhat widened on basal half, fifth and sixth progressively shorter, slender and terete.

Antennæ about as long as entire body; scape subcylindrical, slightly narrowed to base, one and one-half times as long as wide apically; funicle large, more than half length of scape, subcylindrical, slightly narrowed apically; middle flagellar joints about twice as long as wide.

Mesonotum very long, trilobed, the notauli sharply impressed and regularly crenulate as far back as posterior median plane area, the latter with a lanceolate median groove; entire surface of mesonotum smooth and shining. Scutellum anteriorly quadrifoveate, separating carinæ low and equally strong; disk of scutellum smooth. Postscutellum very broadly quadrifoveate. Metanotum very coarsely and openly reticulate-rugose, with a narrow, median, lanceolate groove, which is crossed by several rugæ; metapleura and mesopleura smooth, the latter broadly depressed and irregularly wrinkled below wing, disk with a broad, oblique, curved, deeply impressed, crenulate furrow; spiracle large and subcircular.

Abdomen half again as long as head and thorax together, broadly sessile, six tergites fully exposed, third tergite broadest, all strongly sculptured; first tergite with length nearly one and one-half times the apical width; second tergite about as long as first, little widening apically, sides straight, length subequal to apical width; remaining tergites subequal in length, together somewhat more than half length of second and progressively narrower, sixth with a concave apical margin; a very narrow point of seventh segment projecting beyond sixth; first and second tergites very coarsely and longitudinally striate, striae on second segment somewhat oblique; striae on remaining tergites finer, thicker, more irregular, and strongly oblique; second suture impressed, but completely connate, the striae continuous across it; remaining sutures normal, but followed by deeply impressed, crenulated borders; first and second tergites with a strong median carina. Hypopygium large, as long as

fifth and sixth segments together, and deeper than these segments, projecting nearly one third of its length beyond apex of abdomen; ovipositor very short and curved.

Stigma long, its length about five times its width, radius inserted at two fifths from base; first abscissa of radius less than half length of second; second cubital cell very long, not narrowed apically, the length nearly three times the width; the first transverse cubitus strongly oblique, the second perpendicular and decolored; recurrent vein entering extreme apex of first cubital cell; parallel vein straight and inserted at lower third; submedian cell but little longer than median; radial vein in hind wings distinct but pale; nervellus oblique and strongly curved.

Luzon, Laguna, Mount Banahao (Baker).

A second female specimen, from Mount Maquiling, is referred to this species, although it differs considerably in color and even in certain minor structural characters. The antennæ and the head are entirely pale; the mesonotum is pale and black-bordered; there is more dark color on the pleuræ, and the median metanotal groove is broader and more irregular.

A third female specimen, from Mount Maquiling, has the antennæ dark and the stigma and the veins even darker, but it entirely lacks all piceous and black markings on the body; the metanotal groove is still broader and is crossed by three conspicuously strong rugæ; the recurrent vein enters first cubital cell a little farther from its apex. Apart from these differences it agrees in structural characters with the species described above; it may be called *Rhogas cameroni* var. *flavus*.

The male of this species is smaller (5.5 millimeters), with much less black on dorsum of abdomen, this often reduced to median spots on first, fifth, and sixth tergites. The striæ on fourth to sixth tergites are straight, not oblique, and not quite complete.

The species is named for the late P. Cameron, a very prolific writer on Oriental Hymenoptera.

Rhogas (Aleiodes) palawanicus sp. nov.

Antennæ and thorax ochraceous; head, abdomen, and legs pale stramineous; first, fourth, fifth, and sixth tergites slightly darkened at base, second and third darkened along median longitudinal line. Wings iridescent, very faintly smoky, and with three large, indistinct, whitish areas—one in marginal cell, one in anal cell, and one covering part of first cubital and first discoidal cells. Veins, with stigma, stramineous or slightly smoky in part, first abscissa of radius much darker, in sharp contrast

to remainder, the costal margin ochraceous.

Male, length, 3.5 millimeters.

Head viewed from above with very large, but not bulging eyes, which deeply enter vertex, distance between them equal to distance from occipital margin to front margin of anterior ocellus; vertex back of ocelli rather short, due to the very strongly incurving occipital margin; length from ocelli to occipital margin about equal to length of exposed cheek margin; occipital carina subangularly curved at middle; surface of vertex smooth and shining; ocelli large, distance between ocelli slightly less than distance from ocelli to eyes, the latter distance much less than the long diameter of an ocellus, distance to occipital carina less than twice the long diameter of an ocellus. Face subquadrate, eye margins slightly incurved at sides and not strongly emarginate opposite antennæ; surface very minutely roughened, and not strongly medially raised, median carina subobsolete; mouth opening narrow and subelliptical. Head, viewed from side, with face margin evenly curved and not strongly projecting; cheeks narrow, less than one third width of eye, slightly narrower above than below; malar space small, length little more than width of cheeks below; eye large, its outline long and very broadly elliptical. Maxillary palpi longer than anterior femora, third joint longest and somewhat thinly and slightly broadened on apical two thirds, remaining three joints slender, terete, and subequal.

Mesonotum smooth, shining, deeply impressed anteriorly along line of notaui, which are shallow posteriorly, coarsely crenulate, obsolete on middle of posterior depressed area in the center of which is a short, sharply cut, median furrow. Scutellum anteriorly with two somewhat oblique and rather narrow foveæ, the median separating carina fine and little raised, each fovea having two sharp rudiments of carina at posterior border. Metanotum obscurely reticulate-rugose, the lanceolate median area with sharply raised margins, which are angulately broken where several transverse rugæ pass entirely through the median area; just below the oval metapleural spiracle passes a sharp, complete, longitudinal, sutural carina; meta- and mesopleura smooth and shining, the latter, on posterior half, with a median, oblique, deeply impressed furrow, which has a shallower, curved continuation anteriorly, and below wing a broad, sharply depressed area, which extends downward and forward and is strongly cross striate.

Abdomen broadly sessile, longer than head and thorax to-

gether, and gradually widening to third and fourth segments; first segment very broad at base, basal width equal to three fourths of apical, the length one and one-half times the width at apex; second tergite slightly shorter than first, much wider at apex than at base, length and apical width subequal; third tergite much shorter than second and twice as wide as long; fourth, fifth, and sixth tergites subequal in length, together slightly shorter than third and successively narrower, seventh tergite very short, its hind margin slightly incurved, subangulate point of eighth a little exposed; all tergites coarsely, longitudinally striate, apically punctate-striate, the first two with a delicate median carina, the sculpturing on sixth obsolete apically; the second to fifth sutures strongly depressed and very coarsely crenulate.

Stigma large, about five times as long as broad, broadest and subangulate at two fifths of length from base, at insertion of radius; first abscissa of radius less than half length of second; second cubital cell about twice as long as wide, first transverse cubital very oblique, second slightly so and decolored; recurrent vein joining cubitus a little before first transverse cubitus, the intervening vein decolored; parallel vein inserted at lower third; submedian cell considerably longer than median.

PALAWAN, Puerto Princesa (Baker).

Rhogas (Aciodes) benguetensis sp. nov.

Head (except cheeks), thorax, and legs stramineous; abdomen, cheeks, and antennæ sordid ferruginous, the last paler basally, excepting scape; upper border of propleura narrowly brownish; hind tibiae brownish at extreme base. Wings very faintly smoky, basal vein and apical half of stigma darker.

Male, length, 4.5 millimeters

Head viewed from above transverse, with large, strongly rounded eyes, the distance between them equal to the distance from occipital carina to antennal sockets; vertex with a short outer border to each ocellus sharply depressed; its surface entirely, minutely roughened; vertex strongly narrowed back of eyes, the occipital carina rather short and strongly incurved; length of vertex back of ocelli less than length of exposed cheek margin and about half length of ocellar area; ocelli very large and well separated, distance from ocelli to eyes subequal to interocellar distance and two thirds the long diameter of an ocellus, anterior ocellus slightly farther removed.

Face to mouth longer than wide, considerably wider above,

due to the emargination of the eyes, entirely, transversely rugose, less distinctly so along the median prominence, clypeus nearly smooth; mouth opening small, narrow, subcircular; clypeus small and narrow, basal suture high and narrowly arched; clypeal pits large, distant from eyes about three times their diameter. Head viewed from side with face margin outcurved just below antennæ, then straight to depressed clypeus; cheek narrow, one third width of eye, outer margin parallel with eye margin; malar space large, its length twice the width of cheek; eyes large, subelliptical. Maxillary palpi barely reaching tegulae, slender, terete; third and fourth joints longest, subequal, and each equaling fifth and sixth together; labial palpi short, rather stout, last three joints subequal in length.

Antennæ subequal to entire body in length; scape very short and thick, scarcely longer than width at widest part and little narrowed proximad; funicle stout, more than half length of scape; middle flagellar joints about twice as long as wide.

Mesonotum not distinctly trilobed, though long at middle, notaüli superficial and fine, straight and rather widely separated posteriorly; surface of mesonotum rugulose-shagreened, posterior median area plane and rugose. Scutellum anteriorly bifoveate, foveæ separated by a high, sharp, median carina, each fovea crossed by several low longitudinal carinæ; disk of scutellum shagreened. Metanotum coarsely, irregularly rugose and shagreened between the rugæ, with a strong, entire, straight, median carina; metapleura shagreened on disk, strongly rugose toward borders; spiracle small and circular and with a fine, sinuous, longitudinal, sutural carina passing beneath it; mesopleura shallowly rugose and shagreened, near anterior border with a broad, shallow, vertical depression, entire posterior half suddenly, strongly depressed, this depressed area medially with a series of about five very strong oblique rugæ, which are angulated at middle.

Abdomen little longer than head and thorax together, sessile, subelliptical in outline, slightly broader apically, with four tergites and a part of fifth exposed, first four strongly sculptured, fifth more finely and differently sculptured; first tergite rapidly broadening caudad, its length subequal to apical width, its basal width little greater than half apical width; second tergite very broad, a little shorter than first, length little more than half apical width; third tergite broadest, three fourths length of second, its length much less than half apical width; fourth longer, but narrower than third; first to third tergites coarsely, longitudinally striate and completely, medially carinate, the striae

finer on third tergite; fourth tergite, excepting posterior border, finely rugose; a narrowly rounded point only of fifth tergite visible from above; second suture subconnate and shallow but sharp, remaining sutures normal.

Stigma small, its length about four times its width, radius inserted about two fifths from base; first abscissa of radius about half length of second; second cubital cell about twice as long as wide, slightly narrowed apically; both transverse cubiti a little oblique, the first more so, the second decolored; recurrent vein entering first cubital cell a distance from apex little less than length of first abscissa of radius, intervening vein decolored; parallel vein inserted at lower fifth and suddenly, strongly curved before insertion; submedian cell far longer than median; radial vein in hind wing obsolete; nervellus straight and slightly oblique.

Luzon, Benguet, Baguio (Baker).

This well-marked species is unique in the structure of its mesopleura.

Rhogas (Aclodes) lateralis sp. nov.

Stramineous; antennæ pale piceous, a narrow piceo-ferruginous stripe extending from anterior portion of pronotum across propleura, beneath wings, to hind border of metanotum, continued along lateral border of first tergite and forming spots on lateral borders of second and third tergites; ovipositor sheath piceous and but slightly exceeding abdomen. Wings very faintly smoky, the veins darker, basal third of stigma decolored.

Female, length, 3.5 millimeters.

Head viewed from above thick and short-transverse with large prominent eyes, distance between eyes equal to distance from occipital carina to anterior ocellus; of vertex opaque and shagreened, strongly narrowed back of eyes, occipital carina medially angulate; length of vertex back of ocelli half again greater than length of exposed cheek margin and as long as entire ocellar area; ocelli of medium size and separated rather more widely than usual, distance from ocelli to eyes less than interocellar distance and less than long diameter of an ocellus; distance between hind ocelli equal to long diameter of an ocellus, anterior ocellus slightly farther removed.

Face to mouth longer than wide, as wide below as above, eye margins not strongly incurved below, with a short sharp carina just below antennæ, the entire surface shagreened; mouth opening very small, narrow, and subcircular; clypeus very narrow, basal suture very highly arched, making the length subequal

to width; clypeal pits small, distant from eyes about five times their diameter. Mandibles very short, swollen at base, outwardly roughened. Head viewed from side with face margin slightly elevated below antennæ, then straight to the nearly plane clypeus; cheek very narrow, one fourth width of eye, outer margin parallel with eye margin; malar space large, its length one and one-half times the width of cheek; eye very large, broadly elliptical, slightly narrower on lower fourth. Maxillary palpi reaching tegulae, slender and terete.

Antennæ subequal in length to entire body; scape short and thick, length somewhat greater than width at widest part, and slightly narrowed proximad; funicle little more than half length and width of scape; middle flagellar joints about twice as long as wide.

Mesonotum obscurely trilobed, though long at middle, notauli very superficial, broad, and obscurely crenulate, rather widely separated posteriorly; surface of mesonotum shagreened, posterior median area plane and rugulose. Scutellar foveæ apparently three, the median carina nearly obsolete, but with two distinct lateral carinæ, thus forming one small median and two larger lateral foveæ; disk of scutellum shagreened. Metanotum coarsely, but shallowly, rugose and with a complete, but rather weak, median carina; disk of metapleura anteriorly shagreened, posteriorly rugose; mesopleura radiately rugose from above, and anteriorly with spiracle subcircular and with a continuous, sinuous, longitudinal, sutural carina passing beneath it; an irregular sternopleural carina, a small area on disk below and posteriorly shagreened, but disk entirely without distinct groove or depression.

Abdomen about as long as head and thorax together, broadly sessile, broadened to third segment, remaining three visible segments very rapidly shorter and narrower and smooth and shining; first tergite rapidly broadened apically, length and apical width subequal, basal width more than half the apical width; second tergite slightly longer than first, its length little less than apical width; third tergite about three fourths as long as second, its length about half apical width; first and second tergites strongly, longitudinally striate, third less strongly so and apically with the striae strongly curved toward lateral margin, median apical border smooth; a median carina on first and second tergites and on basal two thirds of third tergite; second suture shallow, curved, and completely carinate, the striae continuous across it; remaining sutures normal.

Stigma large and triangular, its length about three times

its width, radius inserted at about the middle; first abscissa of radius less than half the length of second; second cubital cell about twice as long as wide, rather strongly narrowed apically and rather suddenly so just before apex; first transverse cubitus oblique, second perpendicular and decolored; recurrent vein entering first cubital cell a distance from apex equal to first abscissa of radius, intervening vein decolored; parallel vein inserted at lower fifth and broadly curved before insertion; submedian cell far longer than median; radial vein in hind wing obsolete; nervellus curved and oblique.

Luzon, Laguna, Mount Maquiling (Baker).

Rhogas (Aciodes) subquadratus sp. nov.

Ferruginous; basal half of abdomen, legs, and palpi stramineous; antennæ piceous at tips. Wings faintly smoky, stigma and veins darker, basal vein still darker.

Male, length, 4 millimeters.

Head viewed from above transverse, eyes large and prominent, distance between them equal to the distance from occipital carina to antennal sockets; vertex opaque and shagreened, not strongly narrowed back of eyes, occipital carina evenly incurved; length of vertex back of ocelli less than length of the strongly rounded, exposed cheek margin and about half length of entire ocellar area; ocelli large and well separated, distance from ocelli to eyes less than interocellar distance and less than long diameter of an ocellus; distance between hind ocelli equal to long diameter of an ocellus, anterior ocellus slightly farther removed.

Face to mouth short, about as long as wide, eye margins below not strongly incurved, with a short, sharp carina just below antennæ, the entire surface shagreened; mouth opening narrow and subcircular; clypeus broad, basal suture broadly arched, making the length about half the width; clypeal pits small, distant from eyes about five times their diameter. Head viewed from side with face margin prominent below antennæ, then straight to mouth; cheek narrow, broader above than below, where it is one fourth the width of the eye; malar space of medium size, about as long as upper cheek width; eye very large, broadly elliptical, somewhat narrowed on lower fourth. Maxillary palpi slender, terete, not reaching tegulae; third and fourth joints subequal, fifth and sixth subequal and a little shorter than fourth.

Antennæ subequal to entire body in length; scape rather slender, strongly narrowed apically, the length one and one-half times the width at widest part; funicle slender, half the

length of scape, its length one and one-half times its width; middle flagellar joints a little less than twice as long as wide.

Mesonotum obscurely trilobed, middle lobe rather short, notaüli superficial, but more strongly impressed anteriorly and not widely separated posteriorly; surface of mesonotum rugulose-shagreened, posterior median area plane and strongly rugose. Scutellum anteriorly with six foveæ, separated by low, but equally distinct carinæ; posterior disk of scutellum shagreened. Metanotum very coarsely and heavily rugose and with a straight, entire, median carina; disk of metapleura entirely, coarsely rugose; spiracle circular and with an irregularly sinuous, longitudinal, sutural carina passing beneath it; disk of mesopleura and the lower border shagreened, broad anterior margin and median area rugose and passing posteriorly into a longitudinal depression.

Abdomen about as long as head and thorax together, very broadly sessile, broadened to third segment, remaining segments, extended, as long as second and third segments together, smooth and shining and a little obscurely shagreened; first tergite very short, length two thirds of apical width, basal width subequal to length; second tergite slightly shorter than first, nearly rectangular, length half apical width; third tergite nearly as long as second, its length a little less than half apical width; first and second tergites coarsely and very straight striate, some of the median striae on first tergite converging apically; third tergite more weakly striate on basal two thirds, apical third shagreened and shining; a strong, complete median carina on first and second tergites; second suture but slightly impressed, straight, broad, and completely connate, the striae continuous across it; remaining sutures normal.

Stigma very large, short, broad, and subtriangular, its width about half its length, radius inserted at middle; first abscissa of radius a little more than half length of second; second cubital cell one and two-thirds times as long as broad, very slightly narrowed apically; first transverse cubitus oblique, second perpendicular and decolored; recurrent vein entering first cubital cell a distance from apex a little less than length of first abscissa of radius, intervening vein decolored; parallel vein inserted at lower fifth and suddenly curved just below insertion; submedian cell far longer than median; radial vein in hind wings subobsolete, rudiment at middle slightly curved toward costa; nervellus straight and slightly oblique.

PALAWAN, Puerto Princesa (Baker).

Rhogas (Alciodes) bicolor sp. nov.

Ferruginous, hind tibiae and tarsi darker; antennæ, metanotum, and a large part of first three tergites (excepting a median spot on second) piceous. Wings rather strongly suffused with a smoky tinge, veins dark-colored, basal third of stigma pale.

Male, length, 5.75 millimeters.

Head viewed from above transverse, broad behind the eyes; eyes of medium size, distance between them about equal to the distance from occipital carina to anterior ocellus; vertex opaque and shagreened; occipital carina rather suddenly incurved at middle; length of vertex back of ocelli distinctly greater than length of the oblique exposed cheek margin and slightly greater than the length of entire ocellar area; ocelli large, rather close, distance from ocelli to eyes slightly more than interocellar distance, but less than long diameter of an ocellus; distance between hind ocelli much less than long diameter of an ocellus; anterior ocellus slightly farther removed.

Face to mouth about as long as wide, eye margins below not strongly incurved, very shortly, medially, umbo-carinate just below antennæ, surface shagreened and shallowly, transversely wrinkled above; mouth opening subelliptical and small; clypeus large, strongly swollen, basal suture highly arched, length and width subequal; clypeal pits small, distant from eyes about five times their diameter. Head viewed from side with face sharply prominent below antennæ, and clypeus very prominent; cheek broad, a little less than half the diameter of eye, throughout most of its length with outer-margin parallel to eye margin; malar space rather small, about as long as width of cheek; eye large, broadly subelliptical, slightly broader on lower half. Maxillary palpi slender, terete, not reaching tegulae; third and fourth joints subequal; fifth and sixth subequal and shorter than fourth.

Antennæ subequal to entire body in length; scape broad, not at all narrowed apically, its length about one and one-half times the width at apex; funicle very short and broad, less than half length of scape; length of middle flagellar joints about one and one-half times the width.

Mesonotum obscurely trilobed, middle lobe short, notauli shallow anteriorly, but deep, broad, and strongly converging posteriorly; surface shagreened, lateral lobes posteriorly, obscurely, transversely rugulose, posterior median area plane and strongly rugose. Scutellum anteriorly with six small equal foveæ, the low separating carinæ not complete anteriorly;

posterior disk of scutellum shagreened. Metanotum very coarsely and heavily rugose and with a strong and continuous, but irregular median carina; disk of metapleura shagreened; spiracle circular and with a fine, nearly straight, longitudinal sutural carina passing beneath it; disk of mesopleura posteriorly shagreened, anteriorly rugose, and medially a little depressed, this depression is continued posteriorly in two widely diverging impressed lines.

Abdomen about as long as head and thorax together, broadly sessile, broadened to third segment; remaining segments, extended, as long as second and third together, smooth, obscurely shagreened, and shining; first tergite longer than its apical width, basal width a little greater than one half of apical width; second tergite about as long as first, slightly broadened apically, length subequal to apical width; third tergite about two thirds the length of second and subequal to one half the apical width; first and second tergites coarsely and very straight striate, some of the median striae on first tergite converging apically; third tergite more weakly striate on basal two thirds, apical third shagreened and shining; a strong, complete median carina on first and second tergites and on basal two thirds of third tergite; second suture broadly and strongly impressed, curved, and completely connate, the striae continuous across it; remaining sutures normal.

Stigma of medium size, its length about five times its width, radius inserted at two fifths of the length from base; first abscissa of radius two thirds length of second; second cubital cell one and two-thirds times as long as broad, gradually narrowed apically; first transverse cubitus slightly oblique, second perpendicular, both decolored; recurrent vein entering first cubital cell a distance from apex a little less than length of first abscissa of radius, but equaling second transverse cubitus, intervening vein decolored; parallel vein inserted at lower fifth and broadly curved before insertion; submedian cell far longer than median; radial vein in hind wings subobsolete and straight, nervellus nearly vertical and curved.

Luzon, Benguet, Baguio (*Baker*).

Rhogas melanosoma Ashmead.

Rhogas melanosoma ASHMEAD, Proc. U. S. Nat. Mus. (1905), 28, 970.

Male.—Length 4.5 mm. Head and thorax brownish yellow, the ocelli pale and placed on a black spot, the eyes black; the antennae, except the first two joints, a spot at apex of the middle and hind femora, more or less of the base and apex of the hind tibiae, the hind tarsi, and the whole dorsum of the abdomen, are black. The abdomen is rugulose, the first, second,

and third segments with a median longitudinal carina, that on the third subobsolete. Wings hyaline, the stigma and veins brown.

Type.—Cat. No. 8821, U.S.N.M.

Manila. (Father Brown.)

This species will remain unrecognizable until it has been properly described. Its present position among the known species is purely conjectural. Coloration alone does not furnish safe diagnostic characters in this genus, especially in the subgenus *Aleiodes*, to which this species may pertain.

Rhogas (Aleiodes) mimicus sp. nov.

Stramineous; antennae ferruginous, darker apically; upper borders of pro- and mesopleuræ piceous; abdomen ferruginous, with broad lateral borders of basal half of first segment piceous.

Male, length, 3.5 millimeters.

Head viewed from above transverse, strongly narrowed behind eyes; eyes large and prominent, distance between them about equal to distance from occipital carina to antennal sockets; vertex opaque and shagreened; occipital carina angulate at middle; length of vertex back of ocelli greater than length of the oblique, exposed cheek margin and subequal to length of entire ocellar area; ocelli of medium size, distance from ocelli to eyes somewhat greater than interocellar distance and subequal to the long diameter of an ocellus; distance between posterior ocelli much less than the long diameter of an ocellus, anterior ocellus distinctly farther removed.

Face to mouth a little longer than wide, eye margins below more strongly retreating than above, surface shagreened and slightly elevated medially; mouth opening small, subcircular; clypeus narrow, a little swollen, basal suture highly arched, its length slightly greater than its width; clypeal pits distant from eyes about four times their diameter. Head viewed from side with face above and clypeus very slightly prominent; cheek narrow, about one fourth diameter of eye, its outer margin parallel to eye margin; malar space rather small, its length greater than width of cheek; eye large, broadly subelliptical, slightly broader on lower half. Maxillary palpi slender, terete, not reaching tegulae; third and fourth joints subequal, fifth and sixth subequal and shorter than fourth.

Antennæ distinctly longer than body, scape short and very broad apically, length but slightly greater than apical width; funicle more than half length of scape and strongly narrowed apically; length of middle flagellar joints three times the width.

Mesonotum scarcely trilobate, middle lobe narrowly, but not

greatly, extended cephalad, notaui very shallow and not strongly converging posteriorly; surface shagreened, posterior median area plane and rugulose. Scutellum anteriorly with six small foveæ, median carina much stronger than the others; posterior disk of scutellum shagreened. Metanotum shallowly rugose and with a strong complete median carina; disk of metapleura rugose; spiracle ovate and with an unusually straight, longitudinal, sutural carina passing beneath it; disk of mesopleura irregularly rugose and with a broad, oblique, rugose depression below.

Abdomen slightly shorter than head and thorax together, sessile, broadest on second and third segments, remaining segments, extended, as long as third segment and one half of second segment together, smooth, shagreened, and shining; first tergite longer than its apical width, basal width slightly greater than half the apical; second tergite slightly shorter than first, little broadened apically, length three fourths of apical width; third tergite about three fourths the length of second, its length subequal to half its apical width; first, second, and third tergites coarsely, but shallowly and completely, longitudinally striate; second suture broadly curved, strongly and broadly impressed, and not connate; remaining sutures normal; a strong median carina on first and second tergites and on basal three fourths of third.

Stigma of medium size, its length about five times its width, radius inserted slightly before the middle; first abscissa of radius two thirds length of second; second cubital cell one and one-half times as long as broad, gradually narrowed apically; first transverse cubitus oblique, second perpendicular and decolorized; recurrent vein entering first cubital cell a distance from apex a little less than length of first abscissa of radius, but equaling second transverse cubitus, intervening vein decolorized; parallel vein inserted at lower fourth and broadly curved before insertion; submedian cell much longer than median; radial vein in hind wings entirely obsolete; nervellus straight, oblique, and slightly swollen at middle.

MINDANAO, Agusan, Butuan (*Baker*).

Rhogas (Aleiodes) simillimus sp. nov.

Stramineous; antennæ slightly darker apically; on each side of body a straight, narrow, piceous stripe, running from apex of pronotum to end of lateral margin of first tergite, passing beneath wings and along lateral margins of metanotum. Wings

with very slight smoky suffusion, stigma and veins very pale.

Male, length, 8.25 millimeters.

Head viewed from above rather narrow, thick transverse, strongly narrowed behind eyes; eyes large, but not prominent, distance between them equal to distance from occipital carina to front margin of ocellar area; vertex opaque, shagreened; occipital carina shallowly angulate at middle; length of vertex back of ocelli greater than length of the oblique, exposed cheek margin and slightly longer than entire ocellar area; ocelli small, distance from ocelli to eyes greater than interocellar distance and greater than long diameter of an ocellus; distance between hind ocelli slightly less than long diameter of an ocellus, anterior ocellus scarcely farther removed.

Face to mouth about as long as wide, eye margins evenly incurved, with a short raised carina just below antennæ, surface obscurely, transversely wrinkled; mouth opening rather broad and subelliptical; clypeus transverse and swollen, basal suture broadly arched, length less than width; clypeal pits distant from eyes about five times their diameter. Head viewed from side with face, above, flatly prominent and clypeus very prominent; cheek broad, nearly half width of eye, outer margin in large part parallel to eye margin; malar space rather large, its length greater than width of cheek; eye of medium size, broad, sub-elliptical, a little narrowed on lower fourth. Maxillary palpi slender, terete, reaching tegulae; third and fourth joints subequal, fifth and sixth subequal and shorter than fourth.

Antennæ a little longer than entire body: scape short and very broad apically, length subequal to apical width; funicle large, more than half length of scape, narrowed apically; length of middle flagellar joints three times the width.

Mesonotum scarcely trilobate, middle lobe but little extended cephalad, notaüli broad, rather strongly impressed and crenulate; surface rugulose-shagreened, posterior median area plane and rugose. Scutellum anteriorly with two large foveæ separated by a strong carina, each fovea being divided by two very rudimentary carinæ; posterior disk of scutellum shagreened. Metanotum very coarsely and strongly rugose, basally with a distinct median carina, which apically becomes lost among the heavy rugæ; disk of metapleura rugulose; spiracle circular, a very irregular and incomplete, longitudinal, sutural carina passing beneath it; mesopleura rugulose, with an oblique depression on lower half and an irregular median carina on posterior half.

Abdomen slightly shorter than head and thorax together,

sessile, broadest on third segment, remaining segments entirely retracted; first tergite longer than its apical width, basal width slightly greater than half apical; second tergite subequal to first in length, distinctly broadened apically, length subequal to apical width; third tergite but little shorter than second, its length greater than half apical width; first, second, and third tergites coarsely, but shallowly and completely, longitudinally striate; second suture broad, curved, deeply impressed, and subconnate; a strong median carina on first and second tergites and on basal half of third.

Stigma large, its length about four times its width, radius inserted at two fifths of the length from base; first abscissa of radius two thirds the length of the second; second cubital cell very short, subquadrate, about one fourth longer than broad, not narrowed apically; first transverse cubitus slightly oblique, second nearly perpendicular and decolored; recurrent vein entering first cubital cell a distance from apex equaling first abscissa of radius, intervening vein decolored; parallel vein inserted at lower fourth and broadly curved before insertion; submedian cell far longer than median; radial vein in hind wings nearly obsolete; nervellus curved and nearly vertical.

MINDANAO, Misamis, Iligan (Baker).

This species presents a remarkable resemblance, superficially, to *Rhogas mimicus* sp. nov., but is distinct in structural characters.

Rhogas (Aleiodes) modestus sp. nov.

Pale ferruginous; legs stramineous, all tarsi and apical half of hind femora pale ferruginous; spots on upper border of propleura, beneath wings, sides of postscutellum, and sides of first tergite at base piceous.

Female, length, 5.5 millimeters.

Head viewed from above broadly transverse, strongly narrowed behind eyes, which are large and very prominent, distance between them equaling distance from occipital carina to antennal sockets; vertex roughly and thickly shagreened; occipital carina angulate at middle; length of vertex back of ocelli much greater than the very oblique, exposed cheek margins and distinctly longer than entire ocellar area; ocelli small, distance from ocelli to eyes greater than interocellar distance, but little less than long diameter of an ocellus; distance between hind ocelli much less than long diameter of an ocellus, anterior ocellus not farther removed.

Face to mouth as wide as long, eye margins evenly incurved,

very shortly, medially, umbo-carinate below antennæ, surface transversely wrinkled; mouth opening small, subcircular; clypeus narrow, as long as wide, basal suture highly arched; clypeal pits distant from eyes five times their diameter. Head viewed from side broadly curved from antennæ to mouth, clypeus little swollen; cheek narrower above than below where it is about one third the diameter of eye; malar space large, its length nearly twice lower width of cheek; eye very large, very broadly, bluntly elliptical, a little narrower on lower half. Maxillary palpi slender, terete, reaching tegulae; fourth joint distinctly longer than third, fifth and sixth subequal and slightly shorter than third.

Antennæ a little longer than entire body; scape broad apically, length greater than apical width; funicle very short and broad, about one half length of scape; length of middle flagellar joints one and one-half times width.

Mesonotum scarcely trilobate, middle lobe but little extended, notaüli superficial, but little impressed, and quite widely separated posteriorly, surface roughly and thickly shagreened, posterior median area plane and rugose. Scutellum anteriorly with six small equal foveæ; posterior disk shagreened. Metanotum very coarsely and strongly rugose, and with a strong, straight, complete, median carina; metapleura shagreened on disk, rugose posteriorly; spiracle large and circular, with an evenly curved, longitudinal, sutural carina passing beneath it; mesopleura shagreened above and there with a vertical sharply impressed line, anteriorly and below coarsely rugose along a broad longitudinal impression.

Abdomen as long as head and thorax together, sessile, broadest on third segment, remaining segments progressively shorter and together about as long as third segment; first tergite slightly longer than its apical width; basal width a little greater than half apical; second tergite shorter than first, but little broadened apically, length slightly less than apical width; third tergite three fourths length of second, its length subequal to half apical width; first and second tergites coarsely, straight striate, third completely, but more finely so, striae on latter apically, strongly curving toward lateral borders; remaining segments obscurely shagreened and smooth and shining; second suture straight, narrowly impressed, and connate; a strong median carina on first and second tergites and less strongly extending to two thirds of third tergite.

Stigma large, four times as long as wide, radius inserted

at middle; first abscissa of radius a little more than half length of second; second cubital cell nearly twice as long as wide, a little narrowed apically; first transverse cubitus oblique, second perpendicular and decolored; recurrent vein entering first cubital cell a distance from apex equal to three fourths the length of the first abscissa of radius; parallel vein inserted at lower fifth and curved just before insertion; submedian cell much longer than median; radial vein in hind wings almost obsolete, the rudiment straight; nervellus straight and oblique.

Luzon, Laguna, Los Baños, (Baker).

Rhogas (Aciodes) separatus sp. nov.

Stramineous; antennæ, a narrow lateral stripe passing from pronotum to lateral borders of metanotum, lateral borders of first and second tergites, a spot on lateral borders of third tergite, and entire fourth tergite ferruginous. Wings faintly smoky, veins dark smoky, first abscissa of radius and basal vein darker; basal half of stigma paler.

Male, length, 4.5 millimeters.

Head viewed from above narrow and thick transverse, very strongly narrowed behind eyes, which are of medium size and prominent, distance between them a little greater than distance from occipital carina to fore margin of ocellar area; vertex opaque and thickly shagreened; occipital carina short and nearly straight; length of vertex back of ocelli subequal in length to the very long and very oblique exposed cheek margin and subequal in length to entire ocellar area; ocelli of medium size, distance from ocelli to eyes a little greater than interocellar distance and subequal to the long diameter of an ocellus; distance between hind ocelli less than long diameter of an ocellus, anterior ocellus a little farther removed.

Face to mouth longer than wide, eye margins rather strongly incurved below, a little medially elevated below antennæ, mid-lateral areas depressed, surface shagreened; mouth opening small, subcircular; clypeus rather broad, nearly as long as wide, basal suture highly arched; clypeal pits distant from eyes three times their diameter. Head viewed from side with face margin nearly evenly curved from antennæ to mouth, clypeus but slightly prominent; cheek one third diameter of eye, outer margin parallel to eye margin; malar space large, its length one and one-half times the width of cheek; eye of medium size, broadly subelliptical; maxillary palpi slender, terete, not reaching tegulae, third joint stout, fourth a little longer, third, fifth, and sixth subequal.

Antennæ a little longer than body; scape broad apically, its length but little greater than apical width; funicle very broad at base, narrowed apically, about half length of scape; length of middle flagellar joints about three times the width.

Mesonotum obscurely trilobed, middle lobe rather broadly extended, notauli broad and strongly impressed anteriorly, widely separated posteriorly, surface roughly and thickly shagreened, posterior median area plane and rugose. Scutellum anteriorly with six small foveæ, separating carinæ equally strong; posterior disk of scutellum shagreened. Metanotum shallowly, but thickly, rugose with a well-defined median carina on basal half; metapleura rugose; spiracle circular with a nearly straight, longitudinal, sutural carina passing beneath it; mesopleura rugose, below on posterior two thirds with an oblique depression in which the rugæ are stronger.

Abdomen a little longer than head and thorax together, sessile, broadest on third segment, remaining segments fully exserted, rapidly narrowing, together as long as third and one half of second; first tergite longer than its apical width, basal width two thirds of apical; second tergite about as long as first, but little broadened apically, length greater than apical width; third tergite about three fourths length of second, its length about two thirds apical width; first, second, and third tergites completely, coarsely, irregularly striate and with a complete median carina, striae on third segment slightly diverging apically; second suture broad, straight, deeply impressed, and subconnate.

Stigma of medium size, five times as long as wide, radius inserted at middle; first abscissa of radius three fourths length of second; second cubital cell one and two-thirds times as long as wide, a little narrowed apically; first transverse cubitus oblique, second perpendicular and decolored; recurrent vein entering first cubital cell a distance from apex equal to three fourths length of first abscissa of radius and greater than length of second transverse cubitus; parallel vein inserted at lower fourth and very broadly curved before insertion; submedian cell much longer than median; radial vein in hind wings obsolete; nervellus straight and oblique.

Luzon, Laguna, Los Baños (Baker).

Rhogas (Aciodes) banksi sp. nov.

Stramineous; antennæ ferruginous; on either side of body a narrow piceous stripe, passing from pronotum beneath wings, along lateral margins of metanotum and first tergite, and ending at middle of lateral borders of second tergite.

Male, length, 4.5 millimeters.

Head viewed from above transverse, broad behind the eyes, which are of medium size and prominent, distance between them equaling distance from occipital carina to fore margin of ocellar area; vertex opaque and roughly, thickly shagreened; occipital carina long, strongly incurved at middle; length of vertex back of ocelli nearly twice the length of the very short, oblique, exposed cheek margin and as long as entire ocellar area; ocelli of medium size, distance from ocelli to eyes subequal to interocellar distance and less than long diameter of an ocellus, anterior ocellus not farther removed.

Face to mouth a little longer than wide, eye margins not strongly incurved below, with a rather strong median carina extending halfway to clypeus, the surface shagreened, transversely wrinkled on upper half; mouth opening small, sub-elliptical; clypeus large, nearly as long as broad, basal suture subobsolete; clypeal pits large, distant from eyes about four times their diameter. Head viewed from side with face margin flatly prominent below antennæ, then straight to mouth, clypeus not swollen; cheek narrow, about one fourth diameter of eye, outer margin subparallel to eye margin; malar space large, its length twice the width of cheek; eye large, broadly, bluntly sub-elliptical. Maxillary palpi slender, terete, reaching tegulae; third joint stout, fourth a little longer, fifth and sixth joints subequal and slightly shorter than third.

Antennæ as long as body; scape broadened apically, length one and one half times the apical width; funicle longer than broad and very little narrowed apically; more than one half length of scape; length of middle flagellar joints three times the width.

Mesonotum rather strongly trilobed, middle lobe broadly extended, notauli broad, deeply impressed and crenulate, but stronger posteriorly than anteriorly and posteriorly widely separated; surface finely shagreened, posterior median area plane and rugose. Scutellum anteriorly with two large foveæ, each subdivided by two low, incomplete carinae; posterior disk of scutellum shagreened. Metanotum rather finely, shallowly rugose, with a complete median carina; disk of metapleura shagreened; spiracle ovate, with a strong, sinuous, longitudinal, sutural carina passing beneath it; disk of mesopleura shallowly rugose and with a very broad, shallow depression, extending from beneath forewings to lower posterior angle.

Abdomen as long as head and thorax together, broadest on

third segment, remaining segments exserted and together as long as second segment; first tergite longer than its apical width, basal width two thirds of apical; second tergite a little shorter than first, a little broadened apically, length subequal to apical width; third tergite nearly three fourths length of second, its length two thirds of apical width; first, second, and third tergites completely, coarsely, straight striate and with a complete median carina, striae on second and third tergites slightly diverging caudad; second suture curved, gradually impressed, and subconnate.

Stigma of medium size, five times as long as wide, radius inserted at two fifths of the length from base; first abscissa of radius three fourths length of second; second cubital cell nearly twice as long as wide, narrowed apically; first transverse cubitus oblique, second nearly perpendicular and decolored; recurrent vein entering first cubital cell a distance from apex equal to three fourths length of first abscissa of radius and subequal to second transverse cubitus; parallel vein inserted at lower fifth and curved just before insertion; submedian cell far longer than median; radius in hind wings obsolete; nervellus straight and nearly vertical.

Luzon, Laguna, Mount Maquiling (Baker).

Named for Charles S. Banks, associate professor of entomology in the College of Agriculture, Los Baños, P. I., formerly entomologist in the Bureau of Science, in Manila.

Subgenus Rhogas Nees

Synopsis of the species.

- a'. Median lobe of mesonotum with an evident, though weak, median carina; submedian cell exceeding median by the length of the transverse median vein.
- b'. Median lobe of mesonotum shagreened and sparsely punctate; third abdominal tergite striate only at base and with a very short median carina; hind tibial spurs unusually long in the female.
brownii sp. nov.
- b'. Median lobe of mesonotum thickly punctate; third tergite striate throughout and without a discernible median carina.
sanchezii sp. nov.
- a'. Median lobe of mesonotum without median carina and finely, thickly, irregularly, roughly wrinkled; third tergite sculptured and carinate to three fourths of its length; submedian cell exceeding median by much more than the length of the transverse median vein.
luzonensis sp. nov.

Rhogas (Rhogas) brownii sp. nov.

Black; first tergite, broad basal portion of second tergite,

fore and mid coxae, fore and mid femora except tips, hind coxae, and basal half of hind femora bright ferruginous; fore and mid tibiae and tarsi piceous; basal third of hind tibiae and hind tarsi, excepting last joint, whitish; antennae black with a narrow whitish band following middle; wings faintly smoky, veins brown, a yellowish mark at costal end of basal vein; ovipositor very short, little exceeding apex of abdomen; hypopygium small and shallow.

Female, length, 8 millimeters.

Head viewed from above broadly transverse, strongly narrowed back of eyes, which large and prominent, distance between eyes subequal to distance from occipital carina to antennal sockets; entire surface closely, coarsely rugose; ocellar area laterally bordered by a very short crenulate groove; occipital carina very strongly incurved at middle; length of vertex back of ocelli less than length of the strongly oblique, exposed cheek margin and subequal to length of entire ocellar area; ocelli small, distance from ocelli to eyes greater than interocellar distance and one and one-half times the long diameter of an ocellus, anterior ocellus farther removed.

Face to mouth broader than long, strongly, coarsely, transversely wrinkled throughout (excepting clypeus), with a strong, elevated median carina on basal half; mouth opening large and subcircular; clypeus large, coarsely punctate, broader than long, basal suture broadly curved and strongly impressed; clypeal pits distant from eyes about four times their diameter. Head viewed from side with face margin strongly prominent below antennae for half its length, clypeus suddenly and strongly prominent; cheek coarsely, transversely wrinkled, very broad, much broader below than above, width at middle about half width of eye; malar space of large size, its length greater than lower width of cheek; eye of medium size, elliptical. Maxillary palpi slender, terete, nearly reaching tegulae; fourth joint longest, basal joint piceous, remainder stramineous.

Antennae about as long as entire body; scape broad throughout, suddenly narrowed at base, length one and one-half times apical width; funicle about half length of scape and narrowed to apex; middle flagellar joints about one and one-half times as long as wide.

Mesonotum trilobed, middle lobe broadly extended with a low, but clearly defined, median carina; surface shagreened and sparsely punctate, notauli very strong and deep, crenulate, strongly converging posteriorly, where they are outwardly mar-

gined by a crenulated furrow, which continues laterally along hind margin of mesonotum; posterior median area with a few low, irregular, longitudinal rugae, which leave two lateral, irregular, elongate, shallow foveæ. Metanotum very strongly, coarsely, and irregularly reticulate-rugose and with a complete, but wavy, median carina; metapleura punctate-rugose; spiracle large, circular, and with a very sinuous, longitudinal, sutural carina passing below it; mesopleura rugose, with a large median area smooth, shining, very sparsely punctate, and crossed obliquely from behind forward and downward by a shallow depression.

Abdomen broadly sessile, slightly longer than head and thorax together, widest at apex of second segment, fourth and following segments but little exerted, together shorter than third segment; first tergite with length greater than apical width, basal width two thirds of apical; second tergite as long as first, little widening apically, sides straight, length subequal to apical width, without depressions along basal border; third tergite about three fourths length of second and slightly narrowed; remaining tergites rapidly narrower and smooth and shining; first and second tergites very coarsely, strongly, irregularly, longitudinally rugose, basal half of third tergite more finely so, apical half of third shining, sparsely punctate, and obsoletely shagreened; first and second tergites with a very strong median carina, a weaker carina on basal third of third tergite; second suture straight, broadly depressed, crenulate, and subconnate.

Stigma large, about five times as long as wide, radius inserted near the middle; first abscissa of radius about half length of second; second cubital cell about one and one-half times as long as wide, slightly narrowed apically; first transverse cubitus a little oblique, second perpendicular; recurrent vein inserted in first cubital cell a distance from apex about equaling first abscissa of radius, intervening vein somewhat swollen; parallel vein inserted at lower sixth, broadly curved before insertion; submedian cell exceeding median by the length of the oblique, transverse median vein; radius in hind wings weak, straight; nervellus curved and a little oblique.

Luzon, Laguna, Mount Banahao (Baker).

The male of this species is slightly smaller than the female; the second tergite is all black, and there is a black spot at the center of the first tergite. The hind tibial spurs are shorter than in the female.

This species is named for Rev. Robert Brown, S. J., formerly

connected with the Weather Bureau in Manila, and who did pioneer work on the hymenopterous parasites of the Philippines.

Rhogas (Rhogas) sanchezii sp. nov.

Black; first tergite, narrow basal portion of second tergite, fore and middle legs, hind coxae, and basal half of hind femora ferruginous; hind tibiae piceous, pale at base; hind tarsi whitish, except last joint. Antennæ black, a narrow white band at middle. Wings faintly smoky, veins brownish.

Male, length, 5.5 millimeters.

Head viewed from above thick transverse, narrowed back of eyes, which are large and prominent, distance between eyes subequal to distance from occipital carina to antennal sockets; entire surface punctate-rugose, the rugæ carried forward between eyes and ocelli; ocellar area bordered by a narrow, complete, impressed groove, which is broader and crenulate at the sides; occipital carina broadly incurved; length of vertex back of ocelli slightly less than length of entire ocellar area; ocelli small, distance from ocelli to eyes much greater than interocellar distance and little greater than long diameter of an ocellus, anterior ocellus farther removed.

Face to mouth broader than long, strongly, coarsely, transversely wrinkled throughout (excepting clypeus), with a strong, elevated, median carina on basal half; mouth opening large, subcircular; clypeus large, coarsely punctate, broader than long, basal suture broadly curved and strongly impressed; clypeal pits distant from eyes four times their diameter. Head viewed from side with face margin broadly curved above, clypeus slightly prominent; cheek closely, finely wrinkled above, punctate below, very broad, much broader below than above, width at middle about half width of eye; malar space large, its length greater than lower width of cheek; eye of medium size, elliptical. Maxillary palpi with third and fourth joints stouter and piceous, the latter being the longest.

Antennæ about as long as entire body; scape broad throughout, length one and one-half times apical width; funicle about half length of scape, narrowed apically; length of middle flagellar joints one and one-half times the width.

Mesonotum trilobed, middle lobe very broadly extended and with a very weak median carina, surface thickly, roughly punctate, lateral lobes more sparsely punctate and shagreened, notaüli very strong and deep, crenulate, strongly converging posteriorly, where they are outwardly margined by a crenulated furrow, which continues laterally along hind margin of mesonotum; pos-

terior median area plane and coarsely rugose. Scutellum anteriorly with two large foveæ, separated by a sharp carina, each fovea within having several low irregular rugæ; posterior disk of scutellum punctate. Metanotum very strongly, coarsely, irregularly rugose, and with a nearly straight, complete, median carina; disk of metapleura coarsely punctate, behind coarsely rugose; spiracle subcircular and with a sinuous, longitudinal, sutural carina passing beneath it; mesopleura very coarsely, irregularly rugose anteriorly, posteriorly shining, sparsely punctate, and with an oblique, shallow depression, passing downward and forward.

Abdomen broadly sessile, slightly longer than head and thorax together, widest at apex of second segment, fourth and following segments but very little exserted, together shorter than third segment; length of first tergite greater than its apical width, basal width two thirds of apical; second tergite as long as first, little widening apically, sides straight, length subequal to apical width, without depressions along basal border; third tergite about three fourths length of second and slightly narrower; remaining tergites very rapidly narrower and smooth and shining; first and second tergites very coarsely, strongly, irregularly, longitudinally striae, third tergite finely, thickly, and completely striae; first and second tergites with a strong, straight, median carina, but no carina discernible on third; second suture narrow, sharply impressed, minutely crenulate, and subconnate.

Stigma large, about five times as long as wide, radius inserted at two fifths of length from base; first abscissa of radius about one third length of second; second cubital cell about one and one-half times as long as wide, slightly narrowed apically; first transverse cubitus a little oblique, second very slightly oblique; recurrent vein inserted in first cubital cell a distance from apex a little less than length of first abscissa of radius and about half the length of second transverse cubital, intervening vein not swollen; parallel vein inserted at lower third, broadly curved before insertion; submedian cell exceeding median by the length of the oblique transverse median vein; radius in hind wings very weak and straight; nervellus curved and a little oblique.

Luzon, Laguna, Mount Maquiling (Baker).

This species is very close to *Rhogas brownii* sp. nov. in general appearance, but is distinct in various important structural characters.

Named for Rev. Francisco de P. Sanchez, S. J., of the Ateneo de Manila, who came to the Philippine Islands fifty years ago and is still an enthusiastic naturalist.

Rhogas (Rhoga) luzonensis sp. nov.

Black; head below eyes, narrow complete orbits, apex of metathorax, first two segments of abdomen, and legs (paler apically) ferruginous; basal third of antennæ piceous, remainder much paler. Wings quite distinctly suffused with a smoky tinge, veins brownish, darker on basal half of wing, the basal third of stigma paler. Hypopygium small and shallow; ovipositor but little exceeding apex of abdomen.

Female, length, 7 millimeters.

Head viewed from above thick transverse, narrowed back of eyes, eyes large and prominent, distance between them equal to the distance from occipital carina to anterior ocellus; surface anteriorly shagreened, posteriorly becoming transversely, rough wrinkled; ocellar area bordered laterally by a short, narrow, impressed groove; occipital carina a little incurved at middle; length of vertex back of ocelli greater than length of entire ocellar area; ocelli small, distance from ocelli to eyes subequal to interocellar distance and less than the long diameter of an ocellus, anterior ocellus not farther removed.

Face to mouth broader than long, transversely, reticulately wrinkled (clypeus smoother), with a strong, elevated, median carina, extending three fourths of length; mouth opening small, subcircular; clypeus large, much broader than long, basal suture broadly curved and sharply impressed; clypeal pits distant from eyes five times their diameter. Head viewed from side with face margin broadly curved above, clypeus a little prominent; cheek roughly shagreened, very broad, at middle half the diameter of eye; malar space very large, its length greater than lower width of cheek; eye of medium size, broadly elliptical. Maxillary palpi stramineous, with third joint stouter and slightly longer than fourth, fifth joint distinctly longer than sixth.

Antennæ about as long as entire body, the scape broad at apex, its length about one and one-half times the width at apex; funicle about half as long as the scape, little narrowed apically; length of middle flagellar joints about one and one-half times the width.

Mesonotum trilobed, middle lobe broadly extended, without median carina, surface finely, thickly, irregularly, roughly wrinkled throughout; notauli broad, strongly impressed, and strongly converging posteriorly; posterior median area plane and rugose. Scutellum anteriorly with four foveæ, the two outer larger, separated by high and equally strong carinæ; posterior disk of scutellum shagreened. Metanotum coarsely, shallowly,

irregularly rugose and with a strong and complete, but very wavy, median carina; disk of metapleura anteriorly, roughly shagreened, posteriorly rugose; spiracle subcircular, the sinuous longitudinal, sutural carina passing beneath it; mesopleura rugose throughout and with a sharply and deeply impressed line extending downward from middle of hind margin.

Abdomen broadly sessile, slightly longer than head and thorax together, widest at apex of second segment, fourth and following segments but little exserted, together about as long as third segment; first tergite with length greater than apical width, basal width two thirds of apical; second tergite as long as first, nearly rectangular, sides straight, length greater than apical width, without depressions along basal border; third tergite about three fourths length of second and nearly as broad; remaining tergites very rapidly narrower, smooth and shining; first and second tergites coarsely, strongly, longitudinally, straight striate, third tergite more finely and thickly striate, the striae running out at three fourths of length and succeeded by a rough shagreening; first and second tergites with a strong median carina, weaker on third tergite, and extending to three fourths of its length; second suture slightly curved, broadly, deeply impressed at middle, narrow and little impressed at side, subconnate.

Stigma large, four times as long as wide, radius inserted at middle; first abscissa of radius about three fourths length of second; second cubital cell about one and two-thirds times as long as wide, slightly narrowed apically; first transverse cubitus slightly oblique, second perpendicular; recurrent vein inserted in first cubital cell a distance from apex slightly shorter than first abscissa of radius, but as long as first transverse cubitus, intervening vein not swollen; parallel vein inserted at lower fifth and broadly curved before insertion; submedian cell exceeding median by much more than the length of the oblique, transverse median vein; radius in hind wings straight and very weak; nervellus curved and a little oblique.

Luzon, Laguna, Mount Maquiling (Baker).

A male from Baguio, Benguet, is slightly smaller than the female, but otherwise agrees very closely throughout.

Subgenus *Alcirkogas* novum

Synopsis of the species.

a¹. Vertex, caudad of ocelli, finely roughened, but never coarsely transversely striate; first transverse cubital vein slightly oblique or perpendicular; small, pale species.

- b'. Notauli anteriorly very shallow and indistinct; first abdominal tergite as broad as long and little narrowed to base; submedian cell but little longer than median; ferruginous..... *ferrugineus* sp. nov.
- b'. Notauli anteriorly deep and strong; first abdominal tergite longer than broad and more strongly narrowed to the base; submedian cell far longer than median; ferruginous, dorsum of abdomen piceous, except disk of second tergite and parts of disk of first and third tergites *montanus* sp. nov.
- a'. Vertex, caudad of ocelli, coarsely transversely striate; first transverse cubital strongly oblique; larger, more deeply colored species.
- c'. Antennae much longer than entire body, flagellar joints about three times as long as wide; width between eyes less than length of head as seen from above; second abdominal suture completely connate, striae continuous across it; body largely ferruginous, legs concolorous; palpi stramineous.
- d'. Distance from ocelli to eyes nearly four times interocellar distance; notauli obsolete posteriorly, metanotal carina nearly complete; median carina on abdomen extending on to base of third tergite; abdomen concolorous *exceptus* sp. nov.
- d'. Distance from ocelli to eyes about twice interocellar distance; notauli distinct throughout; metanotal carina distinct only near base; median carina of abdomen extending on to base of fourth tergite; abdominal dorsum medially black..... *oculatus* sp. nov.
- c'. Antennae shorter than entire body; width between eyes greater than length of head as seen from above; second abdominal suture impressed and not completely connate, striae not continuous across it; body more deeply ferruginous, abdomen partly or wholly black or piceous; legs dark; palpi piceous; metanotum sometimes black. *schultzei* sp. nov.

Rhogas (Aleirhogas) ferrugineus sp. nov.

Pale ferruginous, the legs paler, antennæ darker apically; costa basally ochraceous, stigma stramineous, its lower border and the veins dark smoky; interocellar area piceous.

Male, length, 4 millimeters.

Head viewed from above with eyes small and little bulging, distance between them subequal to length of head; vertex strongly convex, its entire surface minutely, irregularly wrinkled and shagreened; length of vertex back of ocelli subequal to length of exposed cheek margin and to length of entire ocellar area; distance of ocelli from eyes one and a half times interocellar distance and nearly twice the short diameter of an ocellus; posterior ocelli separated by a distance equaling long diameter of an ocellus, anterior ocellus slightly farther removed; occipital margin gently incurved. Face subquadrate, broader than long, finely transversely wrinkled, with a slight median elevation below antennæ; mouth opening very small, subcircular; clypeus very narrow, basal suture arched and impressed; clypeal pits distant from eyes five times their diameter. Head viewed from

side with face margin strongly projecting, especially at antennæ, flat at middle; disk of clypeus prominent; cheeks very broad, upper width about one half upper eye diameter; malar space very large, its length two thirds length of eye and greater than lower width of cheek; eye rather small, subelliptical, narrower below. Maxillary palpi short, not reaching tegulae, third joint shorter than fourth, the latter not as long as fifth and sixth together; labial palpi very short, the joints thick.

Antennæ about as long as entire body, the scape very short and thick, narrowed to base, apical width nearly equaling length, funicle narrower than scape and two thirds its length, strongly narrowed apically; flagellar joints about as long as wide.

Mesonotum with a mere indication of trilobing, surface quite evenly convex; notauli superficial and weak, converging to separated points on hind margin; surface minutely wrinkled and shagreened, median basal area slightly depressed and rugose. Scutellum bifoveate anteriorly, foveæ short and broad and separated by a high, sharp carina, each fovea within having several weak longitudinal rugæ; posterior disk of scutellum with concave sides and very blunt apex, its surface shagreened. Metanotum closely irregularly reticulate-rugose and with a strong and complete median carina; metapleura finely rugose throughout; spiracle small, circular, and with a straight, complete, longitudinal carina passing beneath it; mesopleura finely rugose or wrinkled, a large shining area below hind wings, and near lower margin of disk a broadly impressed, shallow, slightly oblique groove.

Abdomen as long as head and thorax together, broadly sessile, with four fully exposed segments, second and third being broad and parallel-sided; first segment broad and thick at base and near insertion abruptly elevated in two short, oblique discal ridges, length a little less than apical width, entire basal width more than half of apical; second tergite as long as first, subquadrate, its length three fourths the apical width, narrowly depressed along basal border; third tergite as wide and three fourths length of second; fourth narrower and shorter than third, a narrow margin of fifth tergite visible; first three tergites and basal half of fourth finely, longitudinally, but irregularly striate, the striae somewhat oblique on sides of second tergite, caudad; second suture narrowly impressed and crenulate, third normal; first and second tergites with a continuous median carina.

Stigma short and thick, its length four times width, radius inserted at about the middle; first abscissa of radius two thirds length of second; second cubital cell one and a third times as long

as high, a little narrowed apically; first transverse cubitus very slightly oblique, second perpendicular, slightly decolored, cubitus becoming obsolete beyond second cubital cell; recurrent vein joining cubitus a distance before second cubital cell equal to first abscissa of radius, intervening vein decolored; parallel vein inserted at lower third; submedian cell little longer than median; radial vein in hind wings entirely decolored and subobsolete, but its rudiment somewhat curved toward costa at middle; nervellus oblique.

Luzon, Laguna, Mount Maquiling (Baker).

Rhogas (Aleirhogas) montanus sp. nov.

Pale ferruginous, metanotum darker; antennæ apically, interocellar area, and dorsum of abdomen (stronger laterally) piceous; palpi stramineous; legs ochraceous. Wings faintly smoky, veins and stigma pale piceous, the latter discally paler.

Female: Length, 4 millimeters; ovipositor very short.

Head viewed from above with eyes small and little bulging, distance between them subequal to length of head; vertex strongly convex, its entire surface minutely, irregularly, and transversely wrinkled and shagreened; length of vertex back of ocelli subequal to length of exposed cheek margin and more than length of entire ocellar area; distance of ocelli from eyes one and a half times interocellar distance and nearly twice the short diameter of an ocellus; posterior ocelli separated by a distance about equaling the long diameter of an ocellus, anterior ocellus farther removed; occipital margin gently incurved. Face subquadrate, broader than long, very finely transversely wrinkled, with a short, slightly elevated median carina just below antennæ; mouth opening very small and narrow; clypeus short, transverse, apical and basal margins broadly incurved, subparallel; clypeal pits distant from eyes about five times their diameter. Head viewed from side with face prominent at antennæ, broadly rounded below to the prominent clypeus; cheeks very broad, much broader below than above, upper width about one half upper eye width; malar space very large, its length two thirds length of eye and greater than lower width of cheek; eye rather small, subelliptical, slightly narrower below. Maxillary palpi scarcely reaching tegulae, third joint shorter than fourth, the latter not as long as fifth and sixth together; labial palpi very short, joints thick.

Antennæ longer than entire body, scape short and thick, but little narrowed to base, apical width three fourths of length,

funicle narrower than scape and about half its length, little narrowed apically; flagellar joints about twice as long as wide.

Mesonotum with a mere indication of trilobing, notauli large and strongly impressed as far as posterior median area, converging to separated points on hind margin, bounding a rather narrow depressed basal area, this area rugose and with an unusually long, slender, crenulated median furrow; remainder of metanotal surface and scutellar disk very minutely wrinkled and shagreened. Scutellum bifoveate anteriorly, foveæ short and broad and separated by a sharp carina, each fovea within having several weak longitudinal rugæ. Metanotum closely and irregularly reticulate-rugose and with a strong and nearly complete median carina; metapleura rugose throughout, more coarsely so in posterior half; spiracle small, circular, and with a complete, sinuate, longitudinal carina, passing beneath it; mesopleura in large part finely, thickly rugose, more coarsely so below wings; on lower half with a very broad, irregular, shallowly impressed, rugose depression, and at middle of posterior submargin a short, sharply impressed, vertical crease.

Abdomen about as long as head and thorax together, broadly sessile, with four fully exposed segments, second and third broader and becoming very gradually broader caudad; first segment broad and thick at base and near insertion abruptly elevated in two short, sharp, oblique, dorsal ridges, length a little greater than apical width, entire basal width more than half of apical; second tergite slightly shorter than first, subquadrate, its length three fourths the apical width, not depressed along basal border; third tergite three fourths as long as second and becoming slightly wider; fourth narrower and shorter than third; a narrow, strongly rounded margin of fifth tergite visible from above; first two tergites and basal two thirds of third, finely, longitudinally, but irregularly, striate, the striae somewhat oblique on sides of second tergite caudad; apical third of third tergite and all of fourth shagreened; second suture narrowly impressed and crenulate, third normal; first and second tergites and basal two thirds of third tergite with a median carina.

Stigma long, its length five times the width; radius inserted at two fifths of the length from base; first abscissa of radius one half length of second; second cubital cell one and one-third times as long as wide, a little narrower apically; first and second transverse cubiti nearly perpendicular and decolored; cubitus paler beyond second cubital cell, recurrent vein joining cubitus a

distance before second cubital cell equal to first abscissa of radius, intervening vein decolored; parallel vein strongly curved and inserted at lower third; submedian cell far longer than median; radial vein in hind wing obsolete; nervellus but little oblique.

Luzon, Benguet, Baguio (coll. Baker).

Rhogas (*Aleirhogas*) *exceptus* sp. nov.

Pale ferruginous throughout, legs a little paler, antennæ darker apically; interocellar area black; palpi stramineous. Wings very faintly smoky, stigma and veins stramineous.

Female: Length, 5 millimeters; ovipositor very short, but slightly exceeding apex of abdomen.

Head viewed from above rather narrow and long, with eyes small and strongly bulging, the distance between them a little less than length of head; vertex strongly convex, its entire surface strongly sculptured, back of ocelli very strongly transversely striate, at ocelli the striae curving forward between ocelli and eyes; vertex very strongly narrowed back of eyes, length back of ocelli greater than exposed cheek margin and twice the length of entire ocellar area; ocelli small, ocellar area greatly contracted; distance from ocelli to eyes nearly four times interocellar distance and about three times the long diameter of an ocellus; posterior ocelli separated by a distance less than the long diameter of an ocellus, anterior ocellus not farther removed; occipital margin short and straight. Face subsexangular, appearing strongly produced below, owing to the very short eyes, longer than broad between eyes, subtransversely rugose above, smooth below, and on clypeus, with a distinct median carina in basal half; mouth opening very small and narrow; clypeus small, narrow and long, basal suture highly arched, apical margin strongly incurved; clypeal pits distant from eyes about five times their diameter. Eyes not at all emarginate opposite antennæ. Mandibles outwardly strongly sculptured. Head viewed from side with face a little prominent, its margin scarcely curved, clypeus very prominent; cheeks very broad, far broader below than above, upper width about one half eye width; malar space of great size, its length greater than entire eye length and far greater than lower width of cheek; eye small, very short and regularly subelliptical. Maxillary palpi reaching tegulae, third joint slightly the longest, third and fifth subequal, sixth a little shorter; labial palpi very short, the joints thickened.

Antennæ considerably longer than entire body, scape short and thick, strongly narrowed to base, apical width three fourths

of length, funicle narrower than scape and a little more than half its length, strongly narrowed apically; flagellar joints about three times as long as wide.

Pronotum strongly extended, as long as head to anterior ocellus, and strongly sculptured. Mesonotum with a mere indication of trilobing, notauli very superficial and almost obsolete, completely so on posterior half; entire surface thickly and coarsely, but shallowly, reticulate-rugose, more strongly so on the broadly flattened posterior median area. Scutellum sexfoveate anteriorly, separating carinae low and in part irregular and outer foveæ strongly oblique; disk of scutellum very broadly bifoveate. Metanotum closely, irregularly reticulate-rugose and with a strong and nearly complete median carina; metapleura rugose throughout, more coarsely so on posterior half; spiracle small, circular, and with a complete longitudinal carina passing beneath it; mesopleura in large part thickly rugose, more coarsely so below wings and along a median longitudinal line that scarcely represents a discal furrow, and at middle of posterior submargin a short, sharply impressed, vertical crease.

Abdomen about as long as head and thorax together, broadly sessile, with four fully exposed segments, the third broadest, first segment with basal ridges not high, its length subequal to basal width, entire basal width more than half of apical; second tergite slightly longer than first, widening apically, sides straight, its length subequal to apical width, not depressed along basal border; third tergite about three fourths as long as second, subrectangular, length somewhat greater than half width; fourth narrower and shorter than third, and with a subtruncate apical border; a very narrow, strongly rounded margin of fifth tergite visible from above; first to fourth tergites, except narrow hind borders of two latter, entirely, coarsely, irregularly, longitudinally striate, the striae somewhat laterally oblique on apical half of second tergite and on all of third tergite; striae on fourth tergite shallower; second suture very little impressed, not crenulate but with striae continuous across it; third suture normal; first, second, and basal half of third tergite with a median carina.

Stigma broad, its length about four times the width, radius inserted near the middle; first abscissa of radius four fifths length of second, second cubital cell small, one and a half times as long as wide, slightly narrowed apically; first transverse cubitus oblique, second perpendicular and decolored; cubitus paler beyond second cubital cell; recurrent vein joining cubital vein a distance before second cubital cell nearly equal to first abscissa

of radius, intervening vein decolored; parallel vein not strongly curved and inserted at lower fourth; submedian cell far longer than median, transverse median a little oblique; radial vein in hind wings decolored, nervellus oblique.

MINDANAO, Butuan (*Baker*).

Rhogas (Aleirhogas) ocellatus sp. nov.

Ochraceous, entire flagellum darker, palpi stramineous, interocellar area black and with a broad, irregular, longitudinal, median black stripe on dorsum of abdomen. Wings faintly smoky toward base, stigma sordid stramineous, veins pale brownish.

Male, length, 4.5 millimeters.

Head viewed from above rather narrow and long, eyes small and strongly bulging, the distance between them distinctly less than length of head; vertex convex, its entire surface strongly sculptured, back of ocelli very strongly transversely striate, at ocelli the striae curve forward between ocelli and eyes; vertex very strongly narrowed back of eyes, length back of ocelli greater than exposed cheek margin and twice length of entire ocellar area; ocelli very small and ocellar area contracted; distance from ocelli to eyes about twice interocellar distance and about two and one-half times long diameter of an ocellus; posterior ocelli separated by a distance subequal to long diameter of an ocellus, anterior ocellus scarcely farther removed; occipital margin somewhat longer than in *R. exceptus* and distinctly incurved.

Face to mouth about as long as broad between eyes, rugose, smoother above and including clypeus, with a distinct median carina on basal half; mouth opening very small and narrow; clypeus small, narrow, and long, as long as broad; basal suture highly arched, apical margin strongly incurved; clypeal pits distant from eyes about five times their diameter. Eyes not at all emarginate opposite antennae. Mandible outwardly smooth. Head viewed from side with face little prominent, its margin scarcely curved, clypeus very prominent; cheeks very broad, far broader below than above, upper width about one-half eye width; malar space of great size, its length subequal to eye length and much greater than lower width of cheek; eye small, very short and regularly subelliptical, almost subcircular, maxillary palpi reaching tegulae, third and fourth joints subequal, fifth and sixth successively shorter; labial palpi slender.

Antennae considerably longer than entire body; scape short and thick, strongly narrowed to base, apical width three fourths of length, funicle narrower than scape and a little more than

half its length, strongly narrowed apically; flagellar joints about three times as long as wide.

Pronotum strongly extended, as long as head to anterior ocellus, and strongly sculptured. Mesonotum rather distinctly trilobed, notaüli distinct throughout but superficial and not crenulate, converging posteriorly to separated points on hind margin; surface thickly and coarsely reticulate-rugose, posterior median area but slightly depressed and with sculpturing slightly coarser. Scutellum sexfoveate anteriorly, separating carinæ low and in part irregular, and outer foveæ strongly oblique; disk of scutellum coarsely shagreened. Postscutellum very broadly bifoveate. Metanotum coarsely, closely, and irregularly reticulate-rugose and with a median carina only on basal third; metapleura rugose throughout, more coarsely so posteriorly; spiracle small, circular; mesopleura coarsely rugose, more coarsely so anteriorly and beneath wing, and on a short oblique discal area, which is slightly impressed.

Abdomen about as long as head and thorax together, broadly sessile, with four fully exposed and sculptured tergites, fifth partly exposed, third broadest; first segment with basal ridges not high, its length greater than apical width, entire basal width slightly more than two thirds of apical; second tergite slightly shorter than first, little widening apically, sides sinuate behind, its length subequal to apical width, not depressed along basal border; third tergite about three fourths as long as second, subrectangular, length about two thirds of width; fourth narrower and little shorter than third, and with a truncate apical border; fifth considerably exposed, about half width of third and half as long; first to fourth tergites, except narrow hind borders of two last entirely, coarsely, irregularly, longitudinally striate, striae on fourth tergite shallower; second suture very little impressed, not crenulate but with striae continuous across it; third suture normal; first, second, and third tergites and base of fourth tergite with a median carina.

Stigma broad, its length about four times its width, radius inserted near middle; first abscissa of radius two thirds length of second; second cubital cell small, nearly twice as long as wide, rather strongly narrowed apically; first transverse cubitus oblique, second perpendicular and decolored; cubitus a little pale beyond second cubital cell; recurrent vein joining cubitus a distance before second cubital cell nearly equal to length of first transverse cubitus and of first abscissa of radius, intervening vein decolored; parallel vein rather strongly curved before insertion, at lower fourth; submedian cell far longer than median,

transverse median a little oblique; radial vein in hind wings decolored, nervellus oblique.

Luzon, Laguna, Mount Banahao (*Baker*).

This species closely resembles *R. exceptus* in many respects, and might be supposed to be the male of that species, were it not for the numerous differences that are clearly specific.

Rhogas (Aleirhogas) schultzei sp. nov.

Bright ferruginous; legs, except at base, and antennae piceous; intercellular area and palpi piceous; abdominal dorsum piceous to black beyond second segment. Wings slightly smoky, stigma and veins pale brown.

Male, length, 6 millimeters.

Head viewed from above broadly transverse, with eyes small and bulging, distance between them greater than length of head; vertex convex, its entire surface strongly sculptured, back of ocelli shallowly, but coarsely, transversely striate, the striae not curving forward between ocelli to eyes; vertex strongly narrowed back of eyes, but occipital carina long and gently incurved; length of vertex back of ocelli a little less than length of exposed cheek margin and subequal to length of entire ocellar area; ocelli of medium size, ocellar area large; distance from ocelli to eyes about twice intercellular distance and about three times long diameter of an ocellus; posterior ocelli separated by a distance greater than the long diameter of an ocellus, anterior ocellus not farther removed.

Face to mouth wider than long, subquadrate, evenly rugose throughout, clypeus minutely roughened; a short median carina just below antennae; mouth opening small and narrow; clypeus small and narrow, but broader than long, basal and apical margins strongly curved and subparallel; clypeal pits distant from eyes about eight times their diameter. Eyes very slightly emarginate opposite antennae. Mandibles outwardly strongly sculptured. Head viewed from side with rather prominent upper carinated portion and clypeus; cheeks very broad, broader below than above, upper width about equaling eye width; malar space of great size, its length subequal to eye length and greater than lower width of cheek; eye small, elliptical. Maxillary palpi short, stout, not reaching tegulae, fourth joint equaling fifth and sixth together, third shorter. Labial palpi very short, basal joints stout.

Antennae shorter than entire body, scape short, evenly narrowed to base, length nearly twice the apical width, funicle much narrower and one half length of scape, strongly narrowed

apically; length of flagellar joints about one and a half times the width.

Pronotum broad and as long as head to fore margin of posterior ocelli, minutely roughened. Mesonotum not distinctly trilobed, notauli distinct throughout, but superficial, and crenulate only anteriorly, converging posteriorly to separated points on hind margin; surface finely rugose and shagreened, posterior median area slightly depressed and coarsely rugose. Scutellum sexfoveate anteriorly, separating carinae low, outer foveæ oblique, but not strongly so; disk of scutellum subobsoletely rugose and shagreened. Postscutellum very broadly bifoveate. Metanotum very coarsely, thickly, irregularly rugose and with a complete median carina; metapleura rugose throughout; spiracle subcircular; mesopleura very irregularly and coarsely rugose, with a small smoothish shagreened area near center and a short vertical crease near middle of hind margin.

Abdomen a little longer than head and thorax together, broadly sessile, with seven fully exposed tergites, first four sculptured wholly or in part; third tergite broadest; length of first tergite subequal to apical width, entire basal width about two thirds of apical; second tergite slightly shorter than first, slightly widening apically, sides straight, its length somewhat less than apical width, not depressed along basal border; third tergite about three fourths as long as second, subrectangular, length little more than half width; remaining tergites rapidly narrower and shorter to sixth, which is very short, seventh as long as fifth, subtriangular in outline, point bluntly rounded, surface smooth and shining; first and second tergites coarsely, irregularly, longitudinally striate, third and fourth minutely rugose and shagreened basally to nearly smooth apically, fifth and sixth finely shagreened; second suture narrowly, deeply, sharply impressed, subcrenulate, and slightly curved caudad; remaining sutures normal; first and second tergites and basal half of third tergite with a strongly raised median carina.

Stigma broad, its length about four times its width, radius inserted near the middle; first abscissa of radius three fourths length of second; second cubital cell small, length one and one-third times width, scarcely narrowed apically; first transverse cubitus very slightly oblique, second perpendicular, curved, and decolored; cubitus a little pale beyond second cubital cell; recurrent vein joining cubitus a distance before second cubital cell nearly equal to length of first transverse cubitus and of first abscissa of radius, intervening vein decolored; parallel vein rather strongly curved before insertion, at lower fourth; submedian

cell far longer than median, transverse median a little oblique; radial vein in hind wing subobsolete, nervellus but little oblique and somewhat curved.

Luzon, Laguna, Mount Maquiling (*Baker*).

The female of this species agrees with the male in nonsexual structural characters, but is differently colored, the stigma and veins being dark brown, and the entire abdominal dorsum black. Four tergites are fully exposed as viewed from above and a narrow portion of fifth is also visible. The median carina on third tergite extends somewhat farther caudad. The hypopygium is piceous, shallow, rather short, and acute. The ovipositor but slightly surpasses apex of abdomen.

Length, 6.5 millimeters.

Luzon, Laguna, Mount Maquiling (*Baker*).

Another female specimen from Baguio, Benguet, has all of the coloring deeper, and the metanotum is entirely black, but there is no specific difference in structural characters.

Named for Mr. W. Schultze, formerly assistant entomologist in the Philippine Bureau of Science, now an active, independent entomologist, residing in Manila.

REVIEW

The Pre-Spanish Philippines | A suggestive scrap-book | for students | Manila: MCM . XIV | [By Austin Craig]. 16 pp., 8vo.

Particulars of the Philippines' Pre-Spanish Past | (Austin Craig) | [etc: 16 lines] | Manila, MCM . XVI | (2), 29 pp., one plate, 8vo. (Press of E. C. McCullough & Co. Inc., Manila, P. I.)

The Malays | A study into the origin of | the foremost factor in the peopling of the Philippines | [etc.: 19 lines] | Manila, MCM . XVI | 16 pp., 8vo. (Press of E. C. McCullough & Co., Inc., Manila, P. I.)

These interesting source pamphlets, complied by the ingenious professor of history in the University of the Philippines, who is also a member of the Philippine Academy, form part of an attempt to penetrate the mystery that shrouds the origin of the present inhabitants of the Philippines and their cultural sources. Together with the contributions of Dr. N. M. Saleeby, also of the same Academy, on the history and culture of the Moros of the southern Philippines, they afford a valuable nucleus of material with which to enter upon the survey of this inviting, but hitherto neglected, field.

Professor Craig's pamphlet on Malays is largely extracted from General Forlong's Short Studies in the Science of Comparative Religions, which deals with the origin of the Malay race and its primitive religious ideas. Like Saleeby, Forlong believes that the Malays originated on the Asiatic mainland, entering the East Indies from the north and long remaining under the influence of Indian civilization. This theory finds philological evidence in its favor, and in addition to that mentioned by Forlong, another item might be cited from Philippine languages. Thus in the Tagalog there are not a few Sanscrit words,¹ and the term Malay itself, instead of being derived, as Forlong seems to think, from the Indian *mala* (hill), may be more probably connected with the Tagalog *malayo* (far) with its allusion to the long wandering of the race which Forlong emphasizes.²

They have thronged East Africa above 1000 years, and have even a colony at the Cape of Good Hope. They traded everywhere throughout Madagascar—their Malagasy,³ and the Mala-dvipas or Maldives. They colo-

¹ See Pardo de Tavera, *El Sanscrito en la lengua Tagalog*. Paris (1887).

² *Malays*, 2.

³ The similarity between Tagalog and Malagasy has been noted by Philippine writers.

nized 500 miles of the West Coast of India, still known as Mala-bar; the great islands of Sumatra and adjoining mainland known as the Malaka Peninsula, extending over some 700 miles; all the large island kingdoms of Java, Celebes and their dependencies and the extensive eponymous Molucca group.

The less familiar, but in its results more important, migration of the Malays northward is developed by Professor Craig in his two other pamphlets, especially the first.¹ The strong Malay influence in Formosa is noted, and what is more interesting, the extension of the Malayan wave to Japan. To quote one of the sources:²

The Japanese people are a mixture of several distinct stocks. Negrito, Mongolian, Palasiatic and Caucasian features more or less blended, sometimes nearly isolated, are met with everywhere. The Negrito is the least prevalent. Prof. Baetz, who has drawn attention to this type along with the Malayan physiognomy, found it comparatively more pronounced in Kyushu (island of which Nagasaki is the port), where a Malayan immigration is believed to have taken place.

Apparently this author confuses Negrito with Malay, but any one familiar with certain racial types in southern Japan and their resemblance to Filipinos may well believe that a "Malayan immigration" reached there. But it seems not to have stopped even in Japan. To quote further:

Oppert was the first to note that in Korea are two types of faces, the one distinctly Mongolian, and the other lacking many of the Mongolian features and tending rather to the Malay type.³

Following the Malay migration the same author says:

From the Malay Peninsula we may imagine them spreading in various directions. Some went north along the coast, others into the Philippine Islands, then to Formosa, where Mr. Davidson, the best authority, declares that the Malay type prevails. The powerful Black Current, the Gulf Stream of the Pacific, naturally swept northward those who were shipwrecked. The Liu-Kiu Islands were occupied, and the last wave of this great dispersion broke on the southern shore of Japan and Korea, leaving there the nucleus of those peoples who resemble each other so that if dressed alike they cannot be distinguished as Japanese or Korean even by an expert. The small amount of work that has been so far done indicates a striking resemblance between these southern Koreans and the natives of Formosa, and the careful comparison of Korean language with that of Dravidian peoples of southern India reveals such a remarkable similarity, phonetic, stymologic and synthetic, that one is forced to recognize in it something more than mere coincidence.

¹ The Pre-Spanish Philippines.

² Munro, Prehistoric Japan.

³ Hulbert, *The Passing of Korea*, Chapter II.

Thus the Malays appear to have skirted practically the entire inhabited coasts of Asia and to have left a trail stretching from southern Africa to Korea.

Of the cultural influences affecting this widely scattered race, the Indian, as has been mentioned, was the first and most powerful. But in spreading northward, the Malays naturally encountered the civilization that was then dominant in eastern Asia—the Chinese. Craig shows how, as early as the third century of our era, Chinese writers probably mention what we know as the Philippines, grouping them with Formosa; and his chronological leaflet, issued separately from the other pamphlets, indicates that there has hardly been a century since in which reference to the Philippines fails to appear in some Chinese work.

Meanwhile communication between the two countries appears to have continued, persistently even if intermittently, until checked by unwise and ill-adapted immigration restrictions, and one begins to understand from the antiquity of this contact how it is that the Chinese people and their civilization have come to exert such an extensive and permanent, although withal unobtrusive, influence upon the Philippines. The motive of this contact seems to have been primarily commercial. The New History of the T'ang Dynasty, dealing with the period from the seventh to the tenth century of our era, states that—

When Chinese merchants arrive there, they are entertained as guests in a public building and the eatables and drinkables are abundant and clean.¹

This takes as a matter of course the presence of Chinese merchants in the Philippines and points to long-established custom. Incidentally it affords an early instance of the proverbial Malay hospitality. A later work describes in greater detail the manner in which this trade was conducted, relating how the traders—

Live on board ship before venturing to go on shore, their ship being moored in midstream, announcing their presence to the natives by beating drums. Upon this the savage traders race for the ship in small boats, carrying cotton, yellow wax, native cloth, cocoanut-heart mats, which they offer for barter. If the prices (of goods they may wish to purchase) cannot be agreed upon, the chief of the (local) traders (頭人) must go in person, in order to come to an understanding, which being reached the natives are offered presents of silk umbrellas, porcelain, and rattan baskets; but the foreigners still retain on board one or two (natives) as hostages. After that they go on shore to traffic, which being ended they return the hostages. A ship will not remain at anchor longer than three or four days,

¹ *Particulars of the Philippines' Pre-Spanish Past*, p. 10.

after which it proceeds to another place; for the savage settlements along the coast of San-su are not connected by a common jurisdiction.'

One need not wonder, after tracing this phase of the subject, that the retail trade of the Philippines remains to-day in the hands of Chinese merchants.

But these old writers whose work is here made accessible have something more to record than commerce. Social customs, religious beliefs and practices, and even juridical conceptions find a place in their narratives. Thus the historian of the T'ang Dynasty above quoted informs us—

that these primitive inhabitants of the Philippines have no corporal punishments, all transgressions being penalized with fines in gold which vary according to the nature of the offense. Only robbers and thieves are made to suffer death.'

So in contrasting their marital customs with those of his own land he says:

It is not the custom to use go-betweens, or match-makers, in contracting a marriage. Some gold is paid to the relations of the girl and then she is married."

The agreement of all this with what we know from other sources stamps the descriptions as accurate and genuine.

The materials collected by Craig furnish us glimpses of these relations between Chinese and Malays down to the time, when, about the middle of the fifteenth century, the Arab missionaries of Islam first appeared in the southern Philippines. At this point the notable and illuminating work of Saleeby commences, and we thus have the framework for a continuous record of the Malays under the successive influence of three of the most potential civilizations of Asia—the Indian, the Chinese, and the Arabic. Incidentally this reveals the unity and continuity of history and the solidarity of culture in the Far East. For it thus appears that the native races of this region are not isolated units having no relations with one another, but are sharers in a common civilization whose influence has been age-long and far-reaching.

CHARLES S. LOBINGER.

¹ The Pre-Spanish Philippines, p. 4, reproducing extracts from the work of Chau Ju-kua on the Chinese and Arab Trade (in the 12th and 13th centuries).

² Particulars of the Philippines' Pre-Spanish Past, 10.

³ Op. cit., 11.

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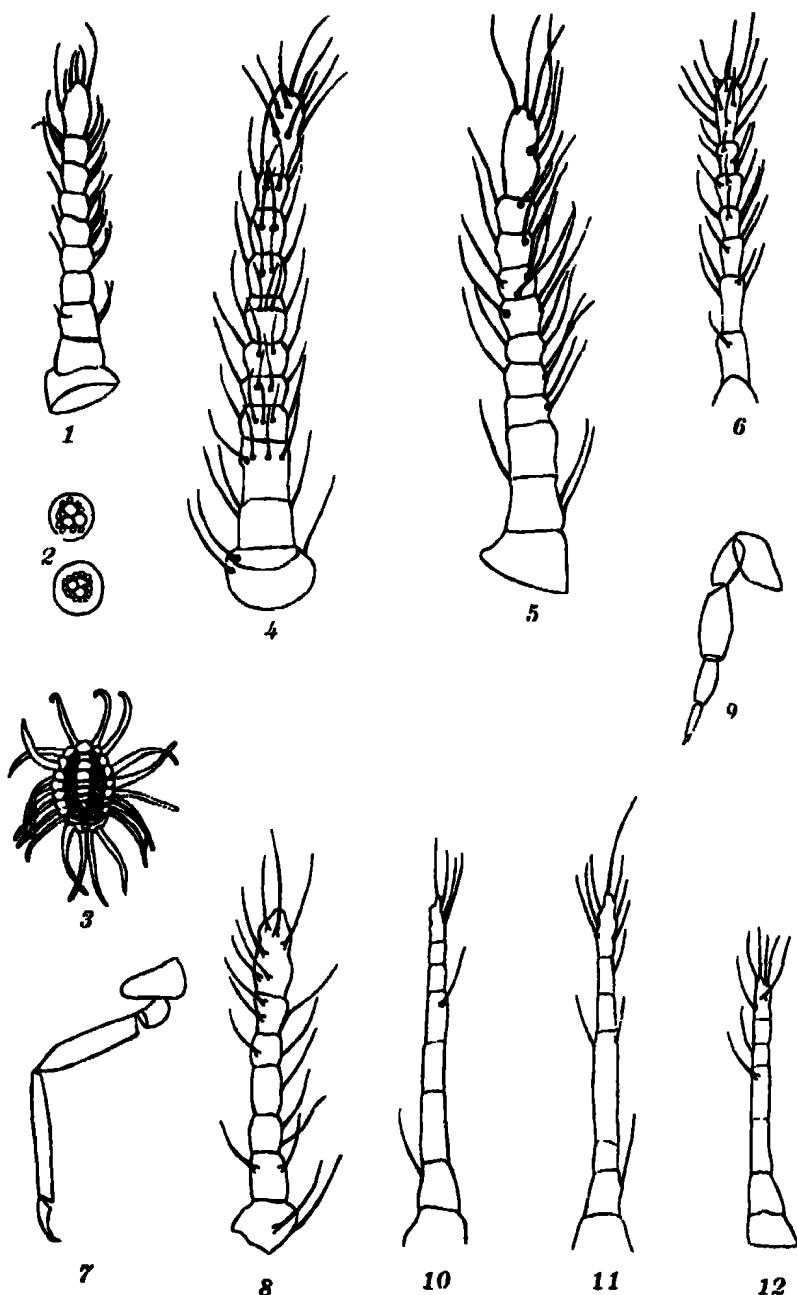
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NOTE TO BINDER

**In binding Section D substitute the following plates for the .
corresponding ones in Nos. 1 and 2.**



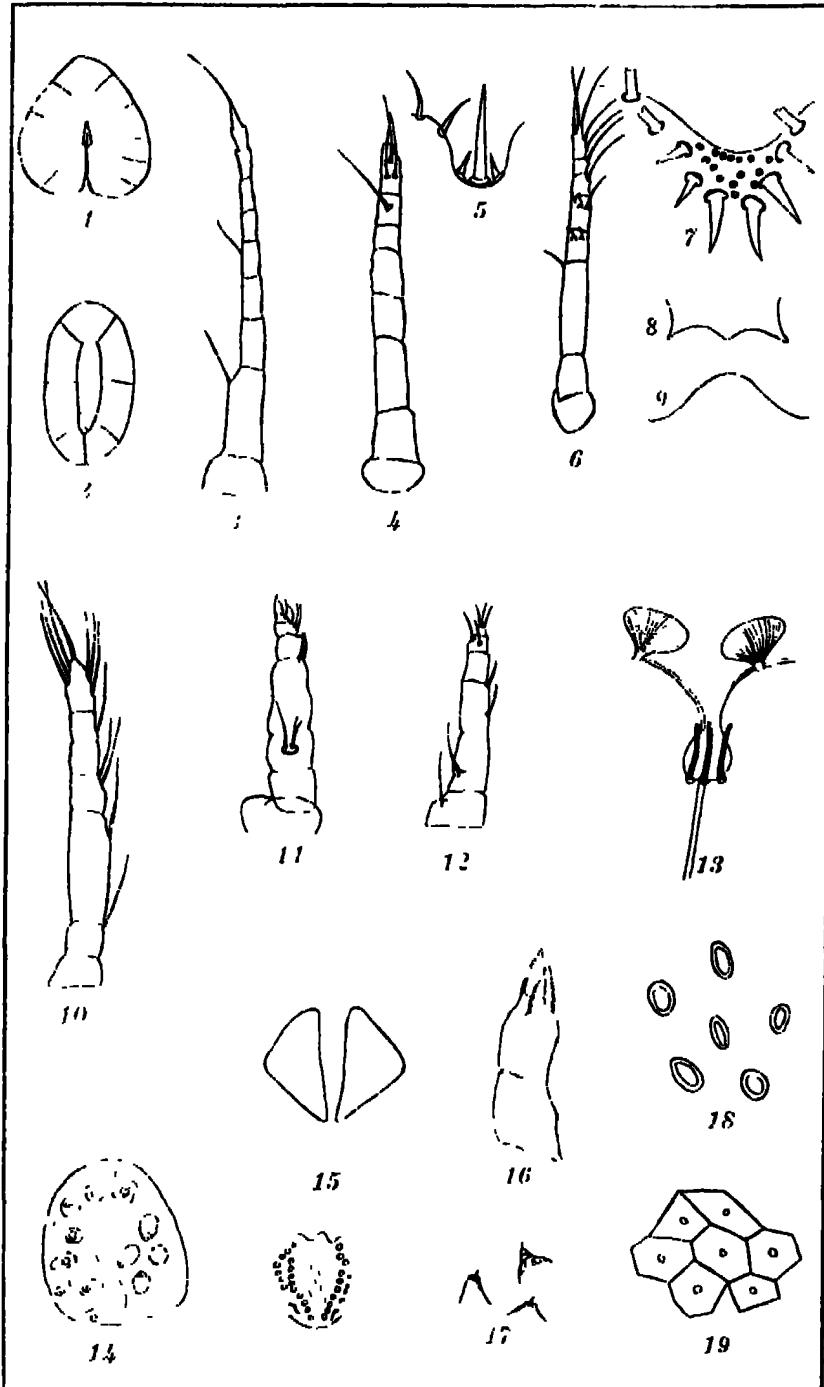
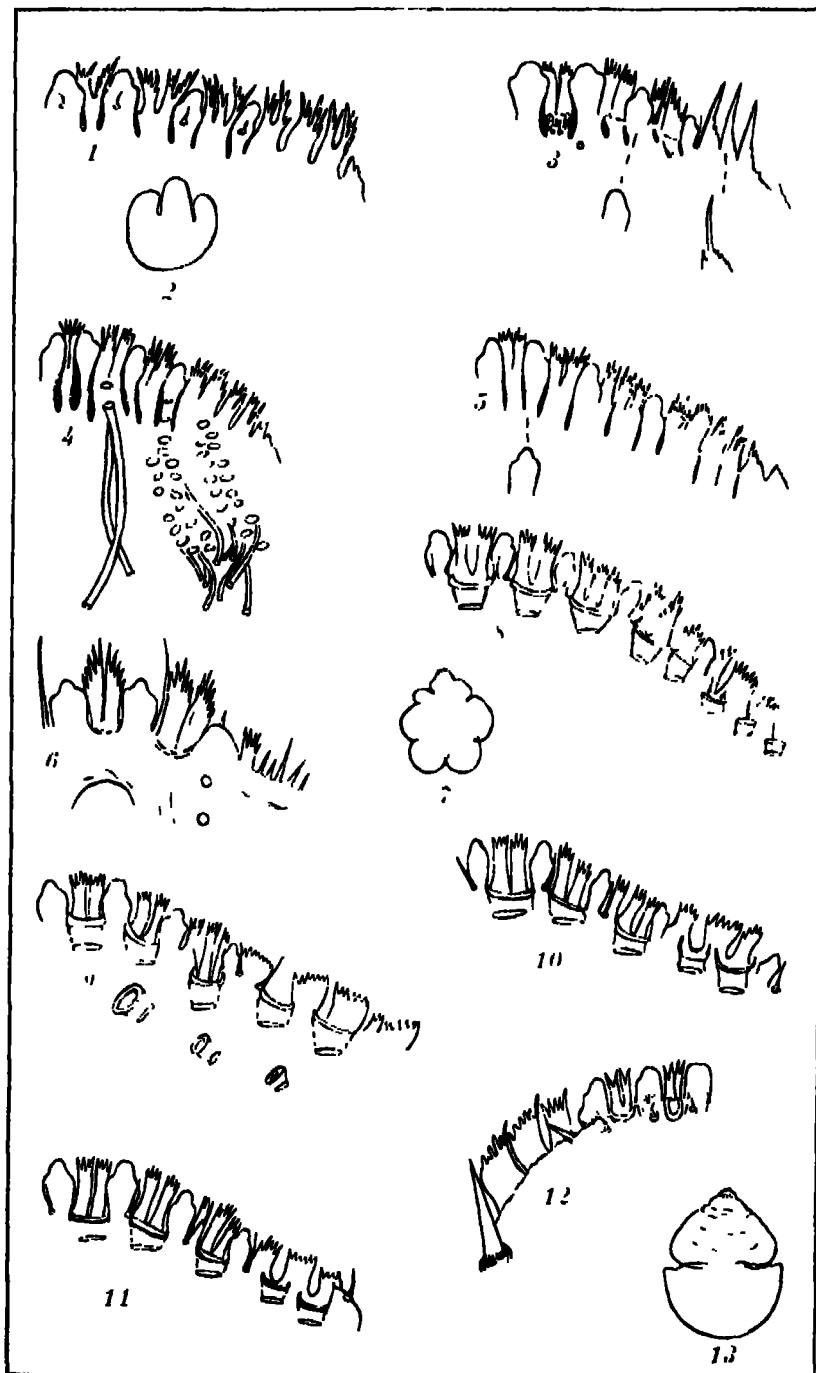


PLATE II PHILIPPINE COCCIDAE



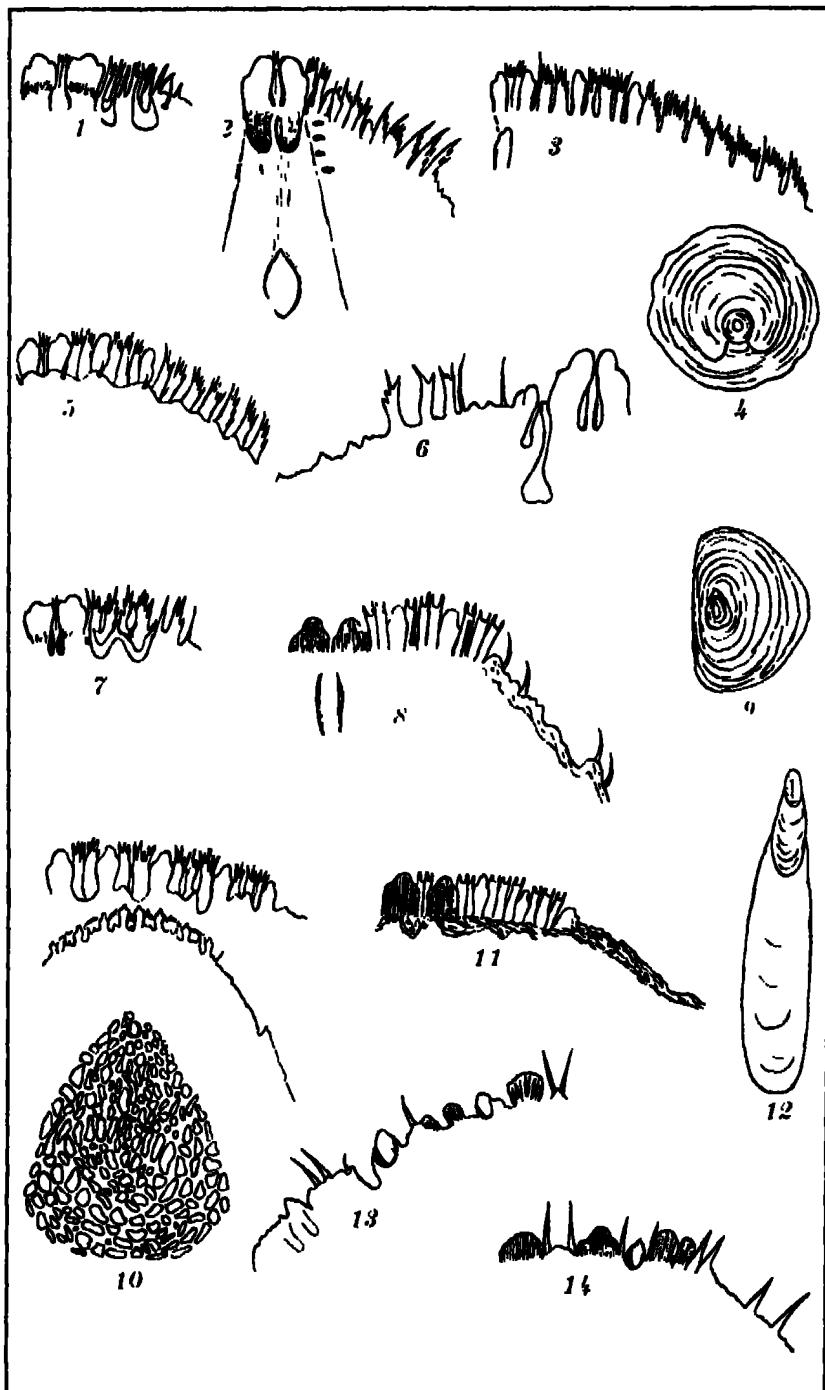


PLATE V PHILIPPINE COCCIDEA.

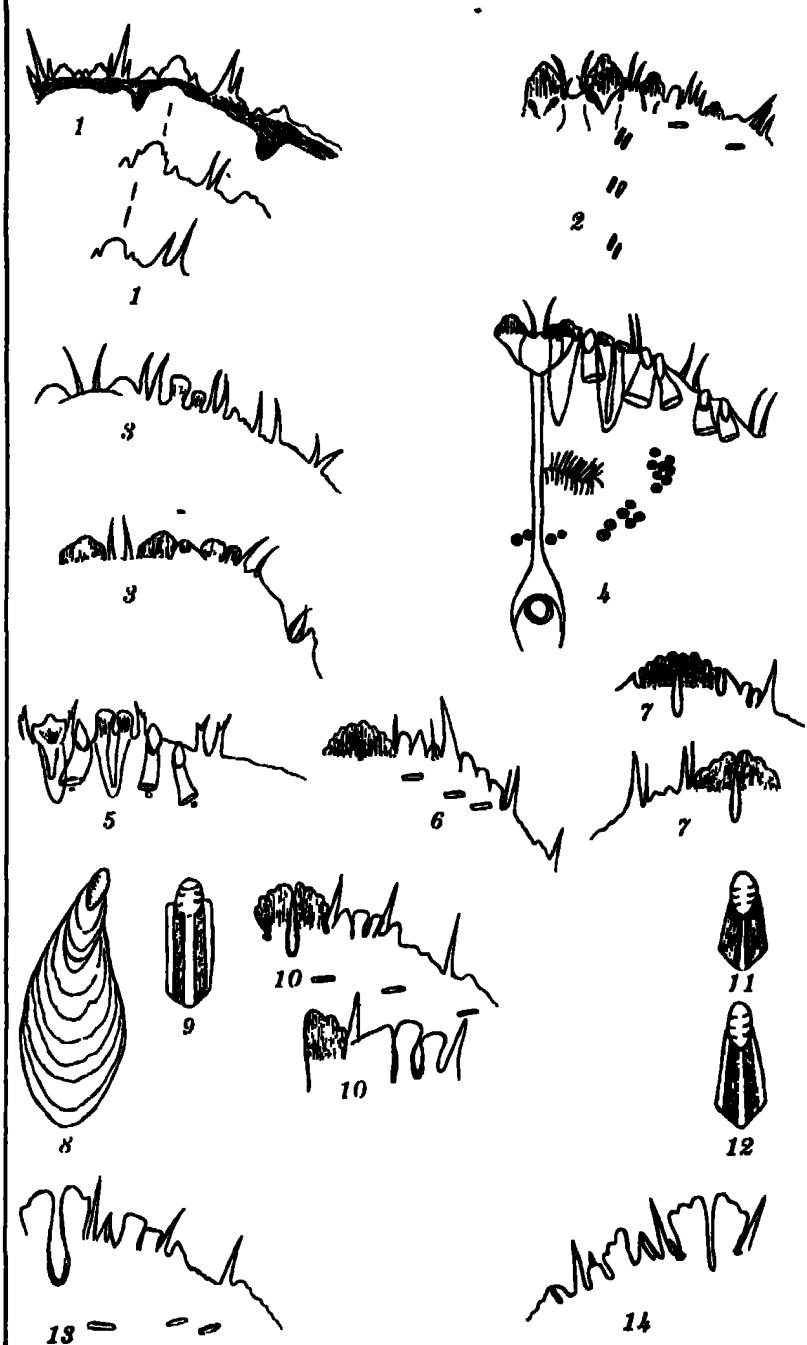


PLATE VI. PHILIPPINE COCCIDA

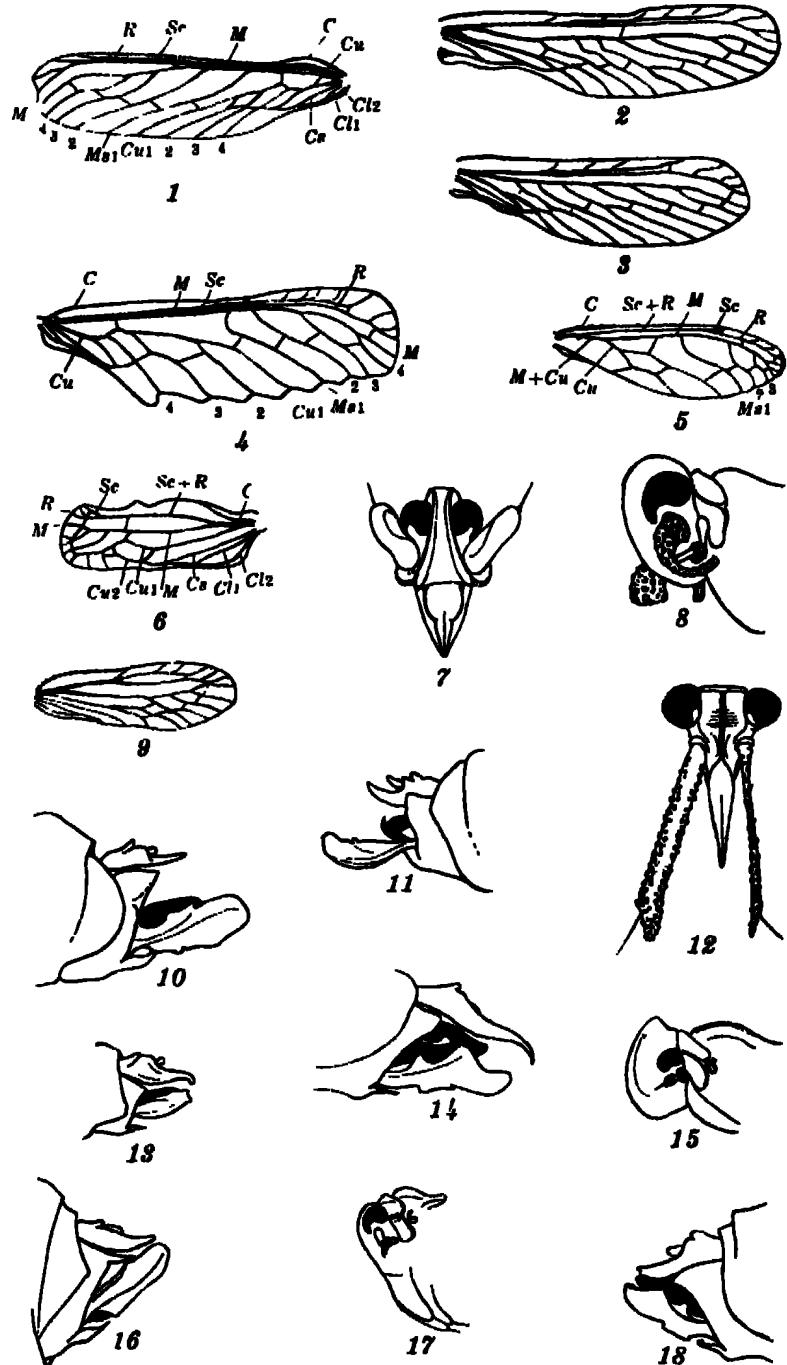


PLATE I. PHILIPPINE DERBIDAE

